Albert E. Riseley

QUANTITY SURVEY HANDBOOK

A. E. Riseley
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$4.
Albert E. Riseley

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Albert E. Riseley

FOREWORD:

To overcome the constant waste of time that the Quantity Surveyor spends in locating various sources of information (e.g. tables, technical bulletins, and procedure notes that aid him in his work), it was decided to collect the relevant data into this one *Quantity Survey Handbook*.

The *Handbook* is intended to be used constantly, by all officers, in the course of their days' work, and is not to be read and put aside.

Although primarily intended for Quantity Survey staff, this *Handbook* is available to anyone who may find the information therein useful.

It is intended to periodically revise and add to the contents as the need arises. Constructive criticisms, suggestions and contributions will always be welcomed.

The officer responsible for the creation of this *Handbook* is Mr H.H. Bunckenburg, Assistant Chief Quantity Surveyor and his efforts are acknowledged herein.

It is with considerable pleasure that I contribute this Foreword and commend this *Handbook* to all concerned.

A.H. JONES,
CHIEF QUANTITY SURVEYOR.

Albert E. Riseley

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BOLTS:

CHART OF BOLT DIAMETERS

Bolt Type	*Abbreviation*	*Thread*	*Diameter in Inches*																				
			1/8	5/32	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2
Cup head-sq neck-sq nuts	Cup sq sq	BSW	–	–	/	√	√	√	√	√	–	√	–	√	√	√	–	–	–	–	–	–	–	–
C'sunk-square neck-sq nuts (for woodwork)	C'sk sq sq	BSW	–	–	–	√	√	√	–	√	–	√	–	√	–	–	–	–	–	–	–	–	–	–
Black square head-sq nuts	Sq rd sq	BSW	–	–	–	√	√	√	√	√	–	√	–	√	√	√	√	√	–	√	–	–	–	–
Black hexagon head-hex nuts	Hex rd hex	BSW	–	–	–	√	√	√	√	√	–	√	–	√	√	√	√	√	√	√	–	√	–	√
High tensile hexagon	SAE grade 5	UNF-UNC	–	–	–	√	√	√	√	√	–	√	–	√	–	–	–	–	–	–	–	–	–	–
High strength structural	Friction grip	UNC	–	–	–	–	–	–	–	√	–	√	–	√	√	√	√	√	√	√	–	–	–	–
High strength bearing	–	UNC	–	–	–	–	–	–	–	–	–	–	–	√	√	–	–	–	–	–	–	–	–	–
Precision-bright forged	Hex hd-hex nts	BSW	–	–	–	√	√	√	√	√	–	√	–	√	–	–	–	–	–	–	–	–	–	–
Bright hexagon head and nuts	Hex rd hex	BSW	–	–	√	√	√	√	√	√	–	√	–	√	√	√	√	√	–	√	–	√	–	√
Bright hexagon head and nuts	Hex rd hex	BSF	–	–	√	√	√	√	√	√	–	√	–	√	√	√	√	√	–	–	–	–	–	–
Bright hexagon head and nuts	Hex rd hex	UNF-UNC	–	–	–	√	√	√	√	√	√	√	–	√	√	√	√	√	–	–	–	–	–	–
Place head	–	–	–	–	–	√	√	√	√	√	–	√	–	√	–	–	–	–	–	–	–	–	–	–
12 point	–	–	–	–	–	√	√	√	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Plow-square nuts	C'sk nib sq or C'sk rd sq C'sk sq sq Sq c'sk rd sq	BSW	–	–	–	–	–	√	√	√	–	–	–	–	–	–	–	–	–	–	–	–	–	–
C'sunk-round neck-hex nuts (for steelwork)	C'sk rd hex	BSW	–	–	–	–	–	–	–	√	–	√	–	√	√	√	–	–	–	–	–	–	–	–
C'sunk nib neck-hex nuts (for steelwork)	C'sk nib hex	BSW	–	–	–	–	–	–	–	√	–	√	–	√	√	√	–	–	–	–	–	–	–	–
C'sunk-square neck-sq nuts (for steelwork)	C'sk sq sq	BSW	–	–	–	–	–	–	–	–	–	√	–	√	√	√	–	–	–	–	–	–	–	–
Fishbolts and nuts	Cup oval hex	BSW	–	–	–	–	–	√	√	√	√	√	√	√	√	√	–	–	–	–	–	–	–	–
Pump bolts-square nuts	Sq sq sq	BSW	–	–	–	–	–	–	–	√	–	√	–	√	√	√	–	–	–	–	–	–	–	–

CHART OF BOLT DIAMETERS – *continued*

Bolt Type	*Abbreviation*	*Thread*	*Diameter in Inches*																						
			1/8	5/32	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2
Deck bolts-square nuts	Cheese sq sq	BSW	–	–	–	–	–	–	–	✓	–	✓	–	✓	–	–	–	–	–	–	–	–	–	–	–
Battery bolts	Hex nut	BSW	–	–	–	–	✓	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Spring centre bolts-hex nuts	Cheese head	BSW	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Elevator-cultivator, tyre bolts	–	BSW	–	–	–	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mattress bolts-square nuts	Hex rd sq	BSW	–	–	–	–	–	–	–	✓	–	✓	–	–	–	–	–	–	–	–	–	–	–	–	–
Mattress bolts-square nuts	Mush rd sq	BSW	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Eye bolts	–	BSW	–	–	–	–	–	–	–	–	–	✓	–	✓	–	✓	✓	–	–	–	–	–	–	–	–
Hexagon and square head coach screws	Gimlet pointed	–	–	–	–	✓	✓	✓	✓	✓	–	✓	–	✓	–	–	–	–	–	–	–	–	–	–	–
Black hexagon set screw	–	BSW	–	–	–	✓	✓	✓	✓	✓	–	✓	–	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Bright hexagon-set screws	–	UNF-UNC	–	–	–	✓	✓	✓	✓	✓	–	✓	–	✓	✓	✓	–	–	–	–	–	–	–	–	–
High tensile hexagon set screws	SAE grade 5	UNF-UNC	–	–	–	✓	✓	✓	✓	✓	–	✓	–	✓	–	–	–	–	–	–	–	–	–	–	–
Bright hexagon set screws	–	BSW	–	–	✓	✓	✓	✓	✓	✓	–	✓	–	✓	✓	✓	–	–	–	–	–	–	–	–	–
Metal thread screws	C'sk head Rd head Cheese head	BSW BSW BSW	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–	✓	–	–	–	–	–	–	–	–	–	–	–

LENGTHS:

The lengths of bolts obtainable from stock varies from $\frac{3}{4}$ inch to 20 inches on the diameter. Lengths outside this range can be obtained by special order. Reference should be made to a price list for the specific length range of any diameter.

RANGES OF SIZES MANUFACTURED:

Bolts	6 B.A. to 2 inch diameter
Nuts	$\frac{3}{16}$ inch to 2 inch diameter
Rivets	$\frac{3}{16}$ inch to 2 inch diameter

THREAD ABBREVIATIONS:

B.S.W.	British Standard Whitworth
B.S.F.	British Standard Fine
B.A.	British Association
UNC	Unified Coarse
UNF	Unified Fine

CONCRETE BLOCKWORK:

MASONRY CONSTRUCTION BY COURSES:

For concrete masonry units $7\frac{5}{8}$ inches in height laid with $\frac{3}{8}$ inch mortar joints. Height measured from bottom of mortar joint to bottom of mortar joint.

Number of Courses	*Height (Feet Inches)*	*Number of Courses*	*Height (Feet Inches)*
1	8	13	8 8
2	1 4	14	9 4
3	2 0	15	10 0
4	2 8	16	10 8
5	3 4	17	11 4
6	4 0	18	12 0
7	4 8	19	12 8
8	5 4	20	13 4
9	6 0	25	16 8
10	6 8	30	20 0
11	7 4	35	23 4
12	8 0	40	26 8

DECIMAL CURRENCY:

DECIMAL CURRENCY IN NEW ZEALAND:

The new coinage denominations are 1c, 2c, 5c, 10c, 20c, and 50c. One and two cent coins are worth 1.2d and 2.4d respectively. 5c equals 6d, 10c equals a shilling, and 20c equals two shillings, while 50c is equal to five shillings.

Banknotes will be redesigned and issued by the Reserve Bank in denominations of $1 (10s.); $2 (£1); $5 (£2 10s. 0d); $20 (£10); $100 (£50). They will be smaller in size. Equivalent values will have the same colours, i.e. $1, 10s.; $2, £1; $10, £5, etc.

SIMPLE CONVERSION RULES:

Double the £'s to obtain dollars:

e.g. £1 = $2

£2 = $4

£10 = $20

The shilling numerals remain the same:

e.g. 1s. = 10c

2s. = 20c

5s. = 50c

Converts pence to cents as follows:

1d = 1c		7d = 6c	
2d = 2c		8d = 7c	
3d = 2c		9d = 8c	
4d = 3c		10d = 8c	
5d = 4c		11d = 9c	
6d = 5c		12d = 10c	

EXCAVATION:

INCREASE IN BULK EXCAVATION:

The following are the increases in bulk of excavated material:

Gravel – $\frac{1}{10}$

Earth – $\frac{1}{4}$

Sand – $\frac{1}{8}$

Chalk – $\frac{1}{2}$

Clay – $\frac{1}{5}$

Rock – $\frac{1}{3}$

Note on the 'Bulking' of Moist Sand –

The weight of aggregates varies according to their source, but 100 lb per cubic foot may be taken as a fair average for sand. If one cubic foot of dry sand weighs 100 lb, the same sand damp and turned over, i.e. direct from the washery, may bulk to one and one-third cubic feet and weigh 106 lb, so that one cubic foot of the damp sand would weigh ($1 \div 1\frac{1}{3} \times 106 = 80$ lb), including moisture content. The degree of bulking may be more or less than 30% maximum, but further increase of moisture would decrease the bulking until saturation is reached, when the volume would be the same as for dry sand.

GLASS:

COLOURED SHEET GLASS:

Type of Glass	*Weight (Ounces)*	*Maximum Size (Inches)*
Flashed ruby	15	54 x 35
	21	54 x 35
Standard ruby	15	54 x 35
	21	54 x 35
Flashed blue (standard)	15	54 x 35
	21	54 x 35
Flashed blue (dark)	15	54 x 35
	21	54 x 35
Signal green	21	51 x 35
Signal yellow	21	54 x 35
Flashed opal	15/18	60/66 x 40
	21/24	60/66 x 40
	32	60/66 x 40
Pot opal	15/18	54 x 35
	21/24	54 x 35

POLISHED PLATE GLASS:

Nominal Thickness (Inches)	*Tolerance*		*Average Weights Per Square Foot*		*Manufacturing Sizes (Inches)*
	Inches	*m/m*	*(Pounds)*	*(Ounces)*	
1/8 – 5/32	7/64 – 10/64	2.78 – 3.97	1	12	100 united inches 60 x 40
1/8 – 3/16 exactly	8/64 – 12/64	3.18 – 4.76	2	0	90 x 50
3/16 –	10/64 – 14/64	3.97 – 5.56	2	7	100 x 72
1/4 bare	12/64 – 16/64	4.76 – 6.35	2	13	100 x 72
1/4 exactly	15/64 – 17/64	5.95 – 6.75	3	4	100 x 72
1/4 –	14/64 – 20/64	5.56 – 7.94	3	7	175 x 98
5/16 – 3/8	20/64 – 25/64	7.94 – 9.92	4	9	180 x 130
3/8 –	23/64 – 27/64	9.13 – 10.72	5	1	280 x 130
1/2 –	30/64 – 34/64	11.91 – 13.49	6	8	156 x 96
5/8 –	38/64 – 42/64	15.08 – 16.67	8	2	156 x 96
3/4 –	46/64 – 50/64	18.25 – 19.84	9	12	156 x 96
7/8 –	54/64 – 58/64	21.43 – 23.02	11	6	144 x 96
1 –	62/64 – 1 2/64	24.61 – 26.19	13	0	144 x 96
1 1/2 –	1 14/64 – 1 18/64	30.96 – 32.54	16	4	108 x 72
1 1/2 –	1 30/64 – 1 34/64	37.30 – 38.89	19	8	90 x 70

PUTTY FOR GLAZING SHEET GLASS:

Type	*Per Foot Super of Pane Sizes Shown*					*Per Foot Run (Pounds)*
	Not Exceeding One Foot (Pounds)	*One Foot to Two Feet (Pounds)*	*Two Feet to Four Feet (Pounds)*	*Four Feet to Six Feet (Pounds)*	*Exceeding Six Feet (Pounds)*	
Wood sashes	0.6	0.4	0.3	0.25	0.2	0.125
Metal sashes	0.8	0.6	0.4	0.33	0.3	0.156

RECOMMENDED GLAZING SIZES:

SHEET GLASS:

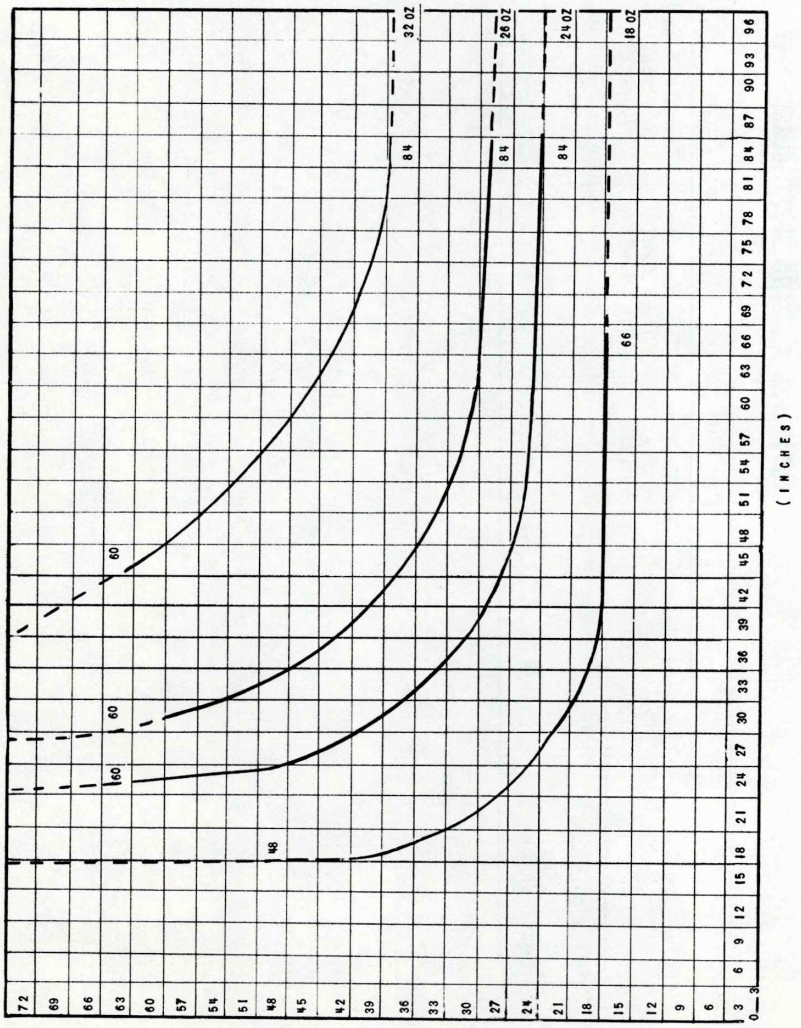
From Pilkington Brothers Technical Bulletin:

The chart below makes possible the determination of recommended maximum glazing sizes in various thicknesses of Sheet Glass. In drawing up the chart numerous other factors besides the basic one of wind pressure have been taken into consideration.

The chart covers vertical glazings up to 40 feet high, and a wind velocity of 63 m.p.h. (one minute mean) or 82 m.p.h. gust velocity (instantaneous).

Example: 24oz. Sheet Glass 32 x 32 in. is the largest square pane which is adequate. Rectangular pane 72 x 21 in. is also suitable.

The continuous lines indicate sizes normally available.



RECOMMENDED GLAZING SIZES – *continued*

FLOAT AND POLISHED PLATE GLASS:

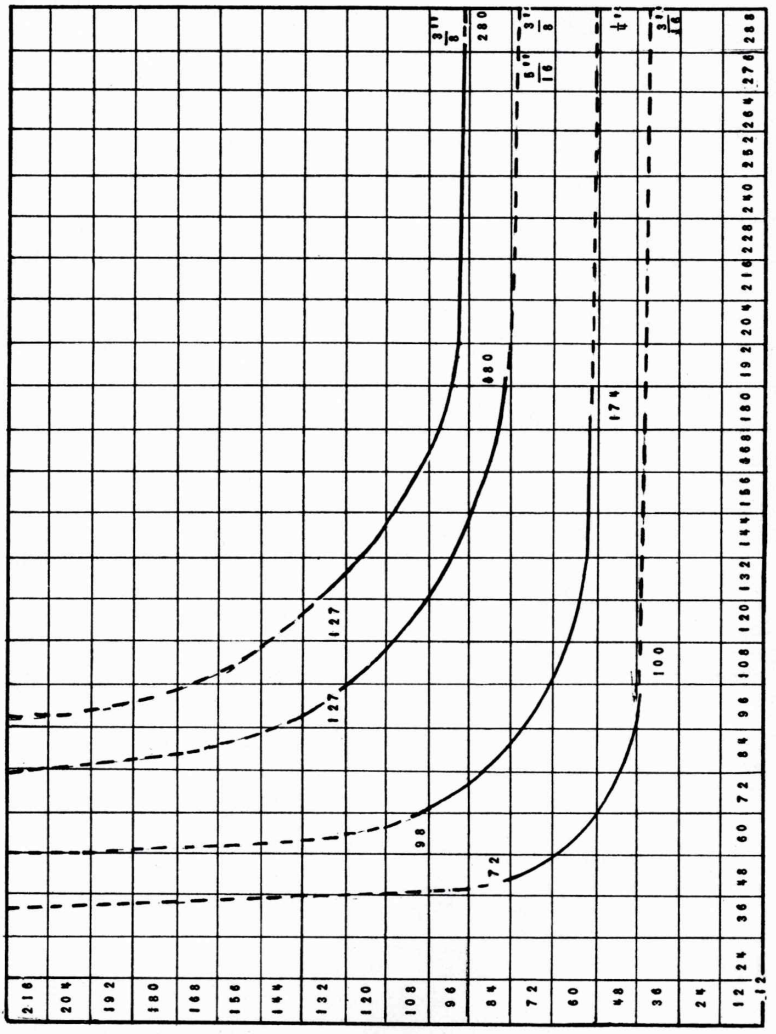
From Pilkington Brothers Technical Bulletin:

The chart below makes possible the determination of recommended maximum glazing sizes in various thicknesses of Float and Polished Plate Glass. In drawing up the chart numerous other factors besides the basic one of wind pressure have been taken into consideration.

The chart covers vertical glazing up to 40 feet high and a wind velocity of 63 m.p.h. (one minute mean) or 82 m.p.h. gust velocity (instantaneous).

Example: in ¼ in. glass 75 x 75 in, is the largest square pane which is adequate. Rectangular pane 144 x 50 in. is also suitable. Glass thicker than ¼ in. substance will be supplied in Polished Plate quality.

The continuous line indicates sizes normally available.



SHEET GLASS:

Thickness	*Possible Variation in Weight Per Square Foot*	*Usual Manufacturing Sizes*
24oz approximately $\frac{1}{16}$"	$22\frac{1}{2}/25\frac{1}{4}$ ounces	Not exceeding 80" long x 48" wide.
26oz approximately $\frac{1}{8}$"	26 $/28\frac{3}{4}$ ounces	
32oz approximately $\frac{5}{32}$"	$31\frac{3}{4}/35\frac{1}{4}$ ounces	

MATHEMATICS:

BRITISH WEIGHTS AND MEASURES:

LINEAR:

Inches	*Feet*	*Yards*	*Fathoms*	*Furlongs*	*Miles*
1	0.0833	0.0277	0.0139	0.000126	0.000016
12	1	0.3333	0.1667	0.001515	0.000189
36	3	1	0.5000	0.004545	0.000568
72	6	2	1	0.009091	0.001136
7920	660	220	110	1	0.125000

SURFACE:

Inches	*Feet*	*Yards*	*Poles*	*Roods*	*Acre*
1	0.0069444	0.0007716	0.0000255	0.00000064	0.00000016
144	1	0.1111111	0.0036731	0.0000918	0.000023
1296	9	1	0.0330579	0.0008264	0.0002066
39204	272¼	30¼	1	0.025	0.00625
1568160	10890	1210	40	1	0.25
6272640	43560	4840	160	4	1

SURFACE (SURVEYORS):

Links	*Poles*	*Chains*	*Roods*	*Acre*	*Square Metres*
1	0.0016	0.0001	0.00004	0.00001	0.04046
625	1	0.0625	0.025	0.00625	25.292
10000	16	1	0.4	0.1	404.6782
25000	40	2.5	1	0.25	1011.696
100000	160	10	4	1	4046.782

BRITISH WEIGHTS AND MEASURES – *continued*

CAPACITY:

Cubic Inches	*Cubic Feet*	*Cubic Yards*
1	0.0005788	0.00000214
1728	1	0.0370370
46656	27	1

WEIGHT (TROY):

Grains	*Dwt.*	*Ounces*	*Pounds*
1	0.0416667	0.0020833	0.0001737
24	1	0.05	0.0041666
480	20	1	0.0833333
5760	240	12	1

WEIGHT (AVOIRDUPOIS):

Drams	*Ounces*	*Pounds*	*Quarters*	*Cwt.*	*Ton*
1	0.0625	0.0039063	0.0001395	0.0000349	0.00000174
16	1	0.0625	0.0022321	0.000558	0.00002790
256	16	1	0.0357143	0.0089285	0.00044643
7168	448	28	1	0.25	0.0125
28672	1792	112	4	1	0.05
573440	35840	2240	80	20	1

BRITISH WEIGHTS AND MEASURES – *continued*

LONG MEASURE:

4 inches	=	1 hand
12 inches (in.)	=	1 foot (ft.)
3 feet	=	1 yard (yd.)
5½ yards	=	1 rod, pole, or perch
40 poles (220 yards)	=	1 furlong (furl.)
8 furlongs (1760 yards)	=	1 mile (m.)
3 miles	=	1 league
1 chain	=	100 links (22 yards)
10 chains	=	1 furlong
6 feet	=	1 fathom
6080 feet or 1.1516 statute mile	=	1 nautical mile (knot)

AREA:

(Square Measure)

144 square inches	=	1 square foot
9 square feet	=	1 square yard
30¼ square yards	=	1 square pole, rod or perch
40 square poles, rods or perches	=	1 rood
4 roods	=	1 acre (4840 square yards)
640 acres	=	1 square mile

MEASURE OF CAPACITY:

(Liquid or Dry Measure)

4 gills	=	1 pint
2 pints	=	1 quart
2 quarts	=	1 pottle
2 pottles	=	1 gallon
4 quarts	=	1 gallon
2 gallons	=	1 peck
4 pecks	=	1 bushel
3 bushels	=	1 bag
4 bushels	=	1 coombe
8 bushels	=	1 quarter
12 bags	=	1 chauldron
5 quarters	=	1 load or wey
2 loads or weys	=	1 last

BRITISH WEIGHTS AND MEASURES – *continued*

MEASURES OF VOLUMES AND CAPACITY:

(Cubic Measure)

1728 cubic inches	=	1 cubic foot
27 cubic feet	=	1 cubic yard
1 marine ton	=	40 cubic feet
1 stack	=	108 cubic feet
1 cord	=	128 cubic feet

(Troy Weight)

3.17 grains	=	1 carat
24 grains	=	1 pennyweight (dwt.)
20 pennyweights	=	1 ounce (oz.troy)
12 ounces (troy)	=	1 pound (troy)
1 pound (troy)	=	5760 grains
1 pound (avoirdupois)	=	7000 grains (troy)

(Avoirdupois Weight)

27.34375 grains	=	1 dram
16 drams	=	1 ounce (oz.)
16 ounces	=	1 pound (lb.)
14 pounds	=	1 stone
2 stones (28 pounds)	=	1 quarter
100 pounds	=	1 cental
4 quarters	=	1 hundredweight (cwt.)
20 hundredweight	=	1 ton

(Apothecaries' Weight)

20 grains or minims	=	1 scruple
3 scruples	=	1 drachm
8 drachms	=	1 ounce
12 ounces	=	1 pound

(Apothecaries' Fluid Measure)

60 minims	=	1 fluid drachm
8 drachms	=	1 fluid ounce
20 ounces	=	1 pint (pt. or Octarius)
8 pints	=	1 gallon (gal., C., or Congius)

(Diamond and Pearl Weight)

3.17 grains	=	1 carat, or
4 pearl grains	=	1 carat
151½ carats	=	1 ounce (troy)

(Paper Measure)

24 sheets	=	1 quire
20 quires	=	1 ream
2 reams	=	1 bundle
10 reams	=	1 bale.

CONVERSION RULES FOR METRIC SYSTEM:

Convert	*Multiply by*
Inches to centimetres	2.54
Centimetres to inches	0.3937
Feet to metres	0.3048
Metres to feet	3.281
Yards to metres	0.9144
Metres to yards	1.094
Miles to kilometres	1.609
Kilometres to miles	0.621
Square miles to square kilometres	2.590
Square kilometres to square miles	0.3861

1 Kilogram = 1000 grammes = 2.205 pounds

DECIMAL EQUIVALENTS:

TWENTY-SEVENTHS:

$\frac{1}{27}$	= 0.04	$\frac{5}{9}$	= 0.55
$\frac{2}{27}$	= 0.08	$\frac{16}{27}$	= 0.59
$\frac{1}{9}$	= 0.11	$\frac{17}{27}$	= 0.63
$\frac{4}{27}$	= 0.15	$\frac{2}{3}$	= 0.67
$\frac{5}{27}$	= 0.19	$\frac{19}{27}$	= 0.70
$\frac{2}{9}$	= 0.22	$\frac{20}{27}$	= 0.74
$\frac{7}{27}$	= 0.26	$\frac{7}{9}$	= 0.78
$\frac{8}{27}$	= 0.29	$\frac{22}{27}$	= 0.82
$\frac{1}{3}$	= 0.33	$\frac{23}{27}$	= 0.85
$\frac{10}{27}$	= 0.37	$\frac{8}{9}$	= 0.89
$\frac{11}{27}$	= 0.40	$\frac{25}{27}$	= 0.93
$\frac{4}{9}$	= 0.44	$\frac{26}{27}$	= 0.96
$\frac{13}{27}$	= 0.48	1	= 1.00
$\frac{14}{27}$	= 0.52		

SIXTEENTHS:

$\frac{1}{16}$	= 0.0625	$\frac{9}{16}$	= 0.5625
$\frac{1}{8}$	= 0.125	$\frac{5}{8}$	= 0.625
$\frac{3}{16}$	= 0.1875	$\frac{11}{16}$	= 0.6875
$\frac{1}{4}$	= 0.25	$\frac{3}{4}$	= 0.75
$\frac{5}{16}$	= 0.3125	$\frac{13}{16}$	= 0.8125
$\frac{3}{8}$	= 0.375	$\frac{7}{8}$	= 0.875
$\frac{7}{16}$	= 0.4375	$\frac{15}{16}$	= 0.9375
$\frac{1}{2}$	= 0.5		

DECIMAL EQUIVALENTS - *continued*

TWELFTHS:

$\frac{1}{12} = 0.0833$

$\frac{1}{6} = 0.1667$

$\frac{1}{4} = 0.25$

$\frac{1}{3} = 0.333$

$\frac{5}{12} = 0.4167$

$\frac{1}{2} = 0.5$

$\frac{7}{12} = 0.5833$

$\frac{2}{3} = 0.6667$

$\frac{3}{4} = 0.75$

$\frac{5}{6} = 0.8333$

$\frac{11}{12} = 0.9167$

MENSURATION:

A and a = area.
b = base.
C and c = circumference.
D and d = diameter.
h = height.
n^o = number of degrees.
p = perpendicular.
R and r = radius.
s = span or chord.
v = versed sine.

SQUARE:

a = side^2; side = $\sqrt{a}$; diagonal = side x $\sqrt{2}$.
Side x 1.4142 = diameter of circumscribing circle.
Side x 4.443 = circumference of circumscribing circle.
Side x 1.128 = diameter of circle of equal area.
Area in square inches x 1.273 = area of equal circle.

CIRCLE:

$a = \pi r^2 = \frac{d^2\pi}{4} = .7854d^2 = .5cr.$

$c = 2\pi r$, or $\pi d = 3.14159d$, or $3.1416d$ approx. $= 3.54\sqrt{a} = 3\frac{1}{7}d$.

or $\frac{22}{7}d$ approx.

Side of equal square = $.8862d$.
Side of inscribed square = $.7071d$.
$d = .3183c$.
Circle has maximum area for given perimeter.

ANNULUS:

$a = (D + d)\ ((D - d)\ \frac{\pi}{4} = \frac{\pi}{4}\ (D^2 - d^2)$.

SEGMENT OF CIRCLE:

a = area of sector - area of triangle
$= \frac{4v}{3}\sqrt{(0.625v)^2 + (\frac{1}{2}s)^2}$.

LENGTH OF ARC:

Length of arc $= .0174533n^o r$

$= \frac{1}{3}\left(8\sqrt{\frac{s^2}{4} + v^2} - s\right)$

Approx. length of arc = $\frac{1}{3}$ (8 x chord of ½ arc - chord of whole arc).

$d = \frac{(\frac{1}{2}\text{ chord})}{v} + v$

radius of curve $= \frac{s^2}{8v} + \frac{v}{2}$

MENSURATION - *continued*

SECTOR OF CIRCLE:

a = .5r x length of arc = $\frac{n^o}{360}$ x area of circle.

RECTANGLE OR PARALLELOGRAM:

$a = bp.$

TRAPEZIUM:

(Two Sides Parallel)

a = mean length of parallel sides x distance between them.

ELLIPSE:

$a = \frac{\pi}{4} Dd = \pi Rr.$

$c = \frac{\sqrt{D^2 + d^2}}{2} \times \pi$ approx., or $\pi \frac{Da}{2}$ approx.

PARABOLA:

$a = \frac{2}{3} bh.$

CONE OR PYRAMID:

Surface = $\frac{\text{circum. of base x slant length}}{2}$ + area of base.

Volume = area of base x $\frac{1}{3}$ vertical height.

FRUSTUM OF CONE:

Surface = ($C + c$) x ½ slant height + area of ends.

Volume = .2618h ($D^2 + d^2 + Dd$)

= $\frac{1}{3}h$ ($A + a + \sqrt{A \times a}$).

PRISM:

Volume = area of base x height.

WEDGE:

Volume = $\frac{1}{6}$ (length of edge + 2 length of back) bh.

MENSURATION - *continued*

SPHERE:

Surface $= d^2\pi = 4\pi r^2$.

Volume $= \frac{d^3\pi}{6} = \frac{4}{3}\pi r^3$.

SEGMENT OF SPHERE:

r = rad. of base.

Volume $= \frac{\pi}{6} h\,(3r^2 + h^2)$.

r = rad. of sphere.

Volume $= \frac{\pi}{3} h^2\,(3r - h)$.

CUBE:

Volume = length x breadth x height.

SPHERICAL ZONE:

Volume $= \frac{\pi}{2} h\,(\frac{1}{3} h^2 + R^2 + r^2)$.

Surface area of convex part of segment or zone of sphere

$= \pi d$ (of sphere) h

$= 2\pi rh$.

Mid-spherical zone:

Volume $= (r + \frac{2}{3} h^2)\frac{\pi}{4}$.

SPHERIOD:

Volume = revolving axis^2 x fixed axis x $\frac{\pi}{6}$.

CYLINDER:

Area $= 2\pi r^2 + \pi dh$.

Volume $= \pi r^2 h$.

TORUS OR SOLID RING:

Volume $= 2\pi^2 Rr^2$

$= 19.74Rr^2$

$= 2.463Dd^2$.

MENSURATION - *continued*

AREA OF IRREGULAR FIGURES:

Simpson's Rule -

To find the **AREA** of an irregular figure, divide the base line into an even number of equal parts to produce an odd number of ordinates spaced a distance 'S' apart. The formula reduces to:

$$\frac{S}{3} (A + 4B + 2C).$$

Where A = sum of 1st and last ordinates

B = sum of even ordinates.

C = sum of odd ordinates.

Expressed as a rule:

Add together the extreme ordinates, 4 times the sum of the even ordinates, and twice the sum of the odd ordinates (omitting the first and last): then multiply the result by one third the space between the ordinates.

VOLUME OF IRREGULAR FIGURES:

Prismoidal Formula -

To find the **VOLUME** of an irregular figure, add together both end areas and four times the mid areas; multiply the result by one sixth the length of the figure.

Thus the formula is:

$$\frac{L}{6} (A + 4B + C).$$

Where L = length.

A = one end area.

B = mid area.

C = remaining end area.

UNITS AND EQUIVALENTS:

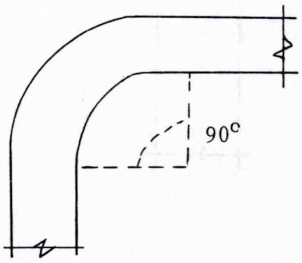
One ft. lb.	=	1lb. raised 1 foot high
One B.T.U.	=	1055 joules
One B.T.U.	=	778.8 ft. lbs.
One watt	=	10 ergs per second
One watt	=	23.731 foot poundals per sec.
One watt	=	0.7376 ft. lb. per second
One watt	=	0.001341 h.p.
One H.P. hour	=	0.746 kW. hour
One H.P. hour	=	1,980,000 ft. lbs.
One H.P. hour	=	2,545 B.T.U.s
One kw.H. (kilowatt hour)	=	2,654,200 ft. lbs.
One kw.H.	=	1000 watt hours
One kw.H.	=	1.34 H.P. hours
One kw.H.	=	3412 B.T.U.s
One kw.H.	=	3,600,000 joules
One kw.H.	=	859,975 calories
One H.P.	=	746 watts
One H.P.	=	0.746 kW.
One H.P.	=	33,000 ft. lbs. per minute
One H.P.	=	550 ft. lbs. per second
One H.P.	=	2545 B.T.U.s per hour
One H.P.	=	42.4 B.T.U.s per minute
One H.P.	=	0.707 B.T.U.s per second
One H.P.	=	178,122 calories per second.

MECHANICAL SERVICES TERMINOLOGY:

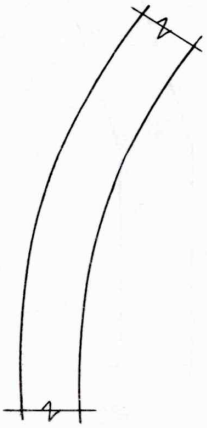
DUCTING TERMINOLOGY:

The following terms will be used in the measuring of duct work and will be given as true value. The terms denote the shapes only. The method of construction will be covered in the preamble.

BEND AT 90° -

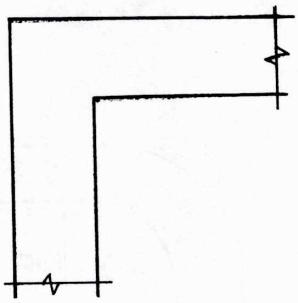


SET OTHER THAN 90° -



DUCTING TERMINOLOGY - *continued*

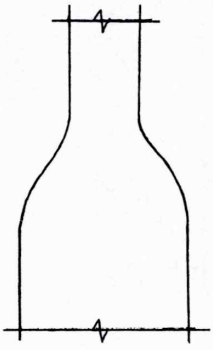
ELBOW -



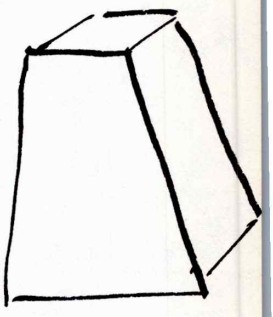
ELBOW SET -

DUCTING TERMINOLOGY – *continued*

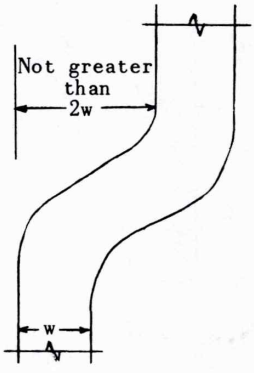
CHANGE SECTION –



or

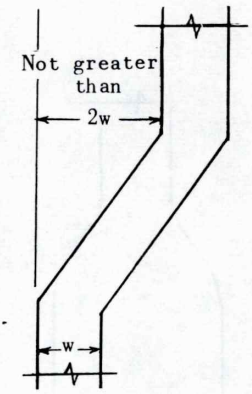


OFFSET –

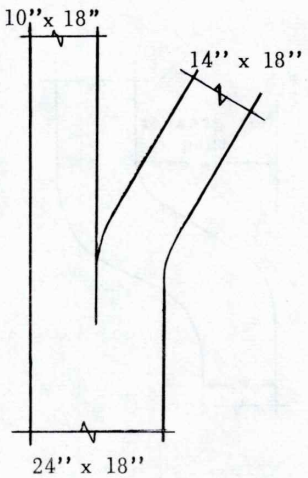


DUCTING TERMINOLOGY - *continued*

ELBOW OFFSET -

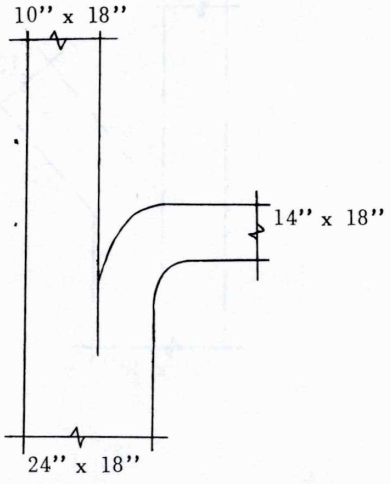


SET JUNCTION -

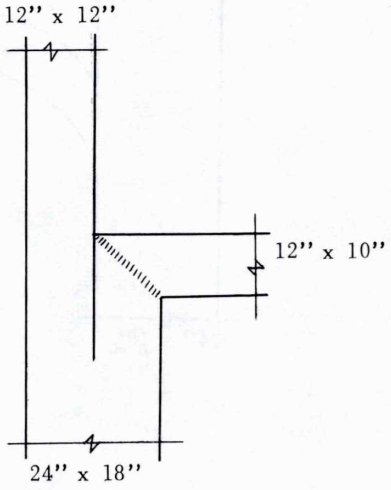


DUCTING TERMINOLOGY – *continued*

BEND JUNCTION –

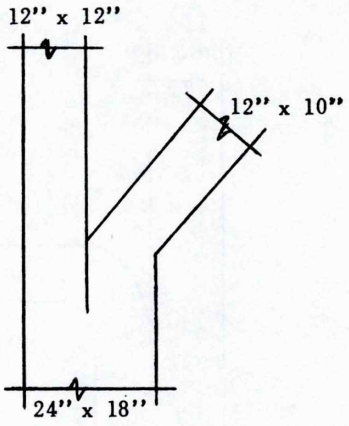


ELBOW JUNCTION –

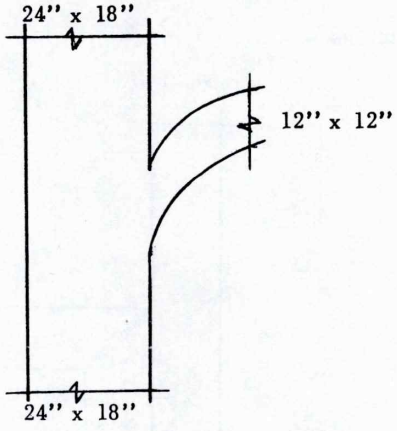


DUCTING TERMINOLOGY – *continued*

ELBOW SET JUNCTION –

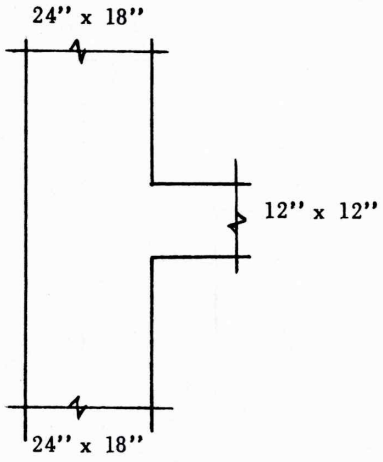


SWEPT JUNCTION –

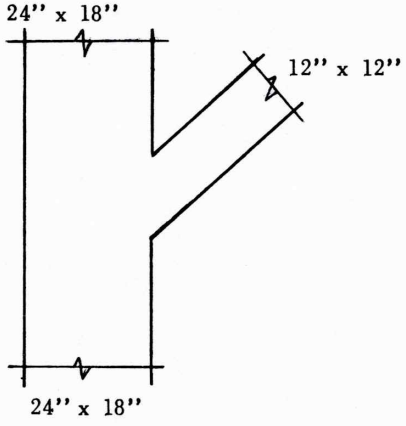


DUCTING TERMINOLOGY – *continued*

SQUARE JUNCTION –

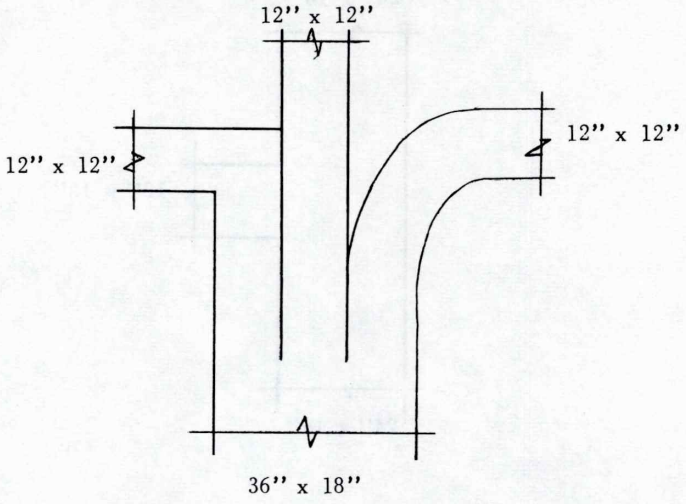


Y JUNCTION –



DUCTING TERMINOLOGY – *continued*

MULTIPLE JUNCTION –



Note: Sizes to be indicated as for pipe work. Use of term side branch.

MILD STEEL SHEET METAL DUCTS:

Size of Duct (Inches)	*Gauge*	*Stiffening for Ducts Slip Jointed; in all Cases an Angle Girth Should be Secured at the Slip Joint*	*Angle Iron Flanged Joints when Specified (Inches)*
RECTANGULAR DUCTS, LONGER SIDE -			
Up to 12	22	None.	1 x 1 x $\frac{1}{8}$
Over 12 and up to 27	20	1" x 1" angle girths at slip joints over 24" width at approximately 6'0" centres.	1 x 1 x $\frac{1}{8}$
Over 27 and up to 33	18	1" x 1" angle girths at slip joints at approximately 6'0" centres.	1 x 1 x $\frac{1}{8}$
Over 33 and up to 42	18	$1\frac{1}{4}$" x $1\frac{1}{4}$" x $\frac{3}{16}$" angle girths at slip joints at approximately 6'0" centres.	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{3}{16}$
Over 42 and up to 60	16	$1\frac{1}{4}$" x $1\frac{1}{4}$" x $\frac{3}{16}$" angle girths at slip joints at approximately 3'0" centres.	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{3}{16}$
Over 60 and up to 72	16	$1\frac{1}{2}$" x $1\frac{1}{2}$" x $\frac{3}{16}$" angle girths at slip joints at approximately 3'0" centres.	$1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{3}{16}$
CIRCULAR DUCTS, DIAMETER -			
Up to 15	22	Swaged at slip joints and intermediate joints.	1 x 1 x $\frac{1}{8}$
Over 15 and up to 30	20	Swaged at slip joints and intermediate joints.	1 x 1 x $\frac{1}{8}$
Over 30 and up to 48	18	Swaged at slip joints and intermediate joints.	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{1}{8}$
Over 48 and up to 60	16	$1\frac{1}{4}$" x $1\frac{1}{4}$" x $\frac{3}{16}$" angle girths at slip joints and approximately 3'0" centres instead of swaging.	$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{3}{16}$
Over 60 and up to 72	16	$1\frac{1}{2}$" x $1\frac{1}{2}$" x $\frac{3}{16}$" angle girths at slip joints and approximately 3'0" centres instead of swaging.	$1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{3}{16}$

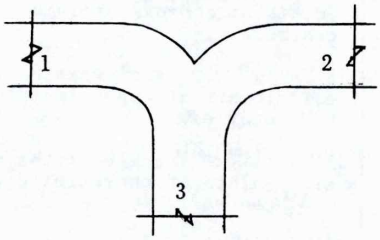
Note: Ducts 72" wide and over, to have, in addition to the above, $1\frac{1}{2}$" x $1\frac{1}{2}$" x $\frac{3}{16}$" angle irons fixed diagonally to top and bottom plates.

PIPE WORK TERMINOLOGY:

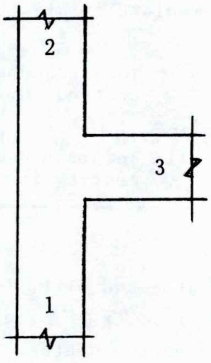
The following terms will be used in the measuring of pipe work and will be given as extra value.

The terms denote the shapes only. The method of obtaining the shape, whether screwed, welded, etc., will be given in the preamble or included with the item.

DOUBLE SWEPT JUNCTION -

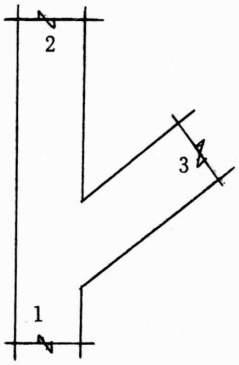


SQUARE JUNCTION -

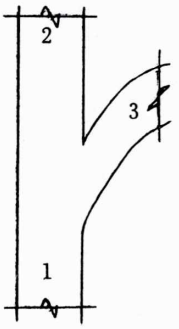


PIPE WORK TERMINOLOGY – *continued*

Y JUNCTION –

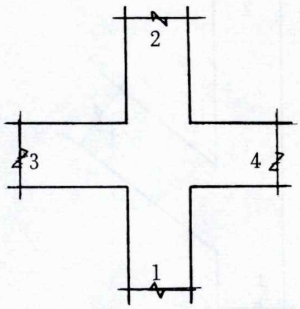


SWEPT JUNCTION –

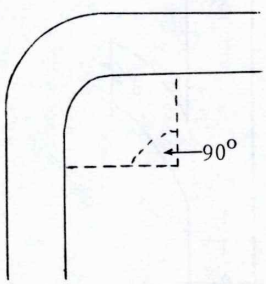


PIPE WORK TERMINOLOGY - *continued*

CROSS JUNCTION -

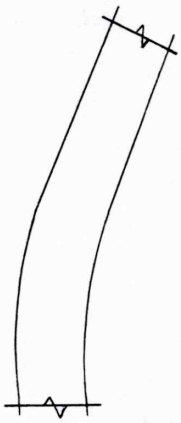


BEND (AT 90°) -

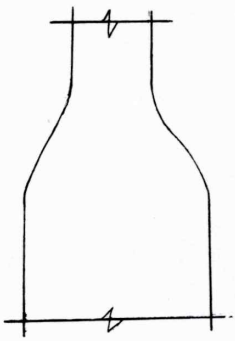


PIPE WORK TERMINOLOGY – *continued*

SET (OTHER THAN 90°) –



CHANGE SECTION –



Note: Numbers give indication of order of sizes.

METAL RODS AND REINFORCEMENT:

REINFORCING STEEL READY RECKONER:

(TO CWT)

Diameter (Inches)	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
$\frac{1}{4}$	0.00149	0.00298	0.00447	0.00596	0.00745	0.00894	0.01043	0.01192	0.01341	0.0149
$\frac{3}{8}$	0.00335	0.00670	0.01005	0.0134	0.01675	0.02010	0.02345	0.02680	0.03015	0.03350
$\frac{1}{2}$	0.00596	0.01192	0.01788	0.02384	0.02980	0.03576	0.04172	0.04768	0.05364	0.05960
$\frac{5}{8}$	0.00932	0.01864	0.02796	0.03728	0.0466	0.05592	0.06524	0.7456	0.08388	0.09320
$\frac{3}{4}$	0.01342	0.02684	0.04026	0.05368	0.06710	0.08052	0.09394	0.10736	0.1207ь	0.13420
$\frac{7}{8}$	0.01825	0.03650	0.05475	0.07300	0.09125	0.10950	0.12775	0.14600	0.16425	0.18250
1	0.02384	0.04768	0.07152	0.09536	0.11920	0.14304	0.16688	0.19072	0.21456	0.23840
$1\frac{1}{8}$	0.03018	0.06036	0.09054	0.12072	0.15090	0.18108	0.21126	0.24144	0.27162	0.30180
$1\frac{1}{4}$	0.03725	0.0745	0.11175	0.14900	0.18625	0.22350	0.26075	0.29800	0.33525	0.37250
$1\frac{1}{2}$	0.05364	0.10728	0.16092	0.21456	0.26820	0.32184	0.37548	0.42912	0.48276	0.53640
2	0.09537	0.19074	0.28611	0.38148	0.47685	0.57222	0.66759	0.76296	0.85833	0.97370

Example: 451'0" L.F. of $\frac{1}{2}$" steel.

= 0.00596

= 0.2980

= 2.384

2.68796 Cwt.

The following chart converts pounds in the same way.

REINFORCING STEEL READY RECKONER - *continued*

(TO POUNDS)

Diameter (Inches)	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
$\frac{1}{4}$	0.167	0.334	0.501	0.668	0.835	1.002	1.169	1.336	1.503	1.670
$\frac{3}{8}$	0.376	0.752	1.128	1.504	1.880	2.256	2.632	3.008	3.384	3.760
$\frac{1}{2}$	0.668	1.336	2.004	2.672	3.340	4.008	4.676	5.344	6.012	6.680
$\frac{5}{8}$	1.043	2.086	3.129	4.172	5.215	6.258	7.301	8.344	9.387	10.430
$\frac{3}{4}$	1.502	3.004	4.506	6.008	7.510	9.012	10.514	12.016	13.518	15.020
$\frac{7}{8}$	2.044	4.088	6.132	8.176	10.220	12.264	14.308	16.352	18.396	20.440
1	2.670	5.340	8.010	10.68	13.35	16.02	18.69	21.36	24.03	26.70
$1\frac{1}{8}$	3.38	6.76	10.14	13.52	16.90	20.28	23.66	27.04	30.42	33.8
$1\frac{1}{4}$	4.172	8.344	12.516	16.688	20.86	25.032	29.204	33.376	37.548	41.720
$1\frac{1}{2}$	6.008	12.016	18.024	24.032	30.040	36.048	42.056	48.064	54.072	60.080
2	10.681	21.362	32.043	42.724	53.405	64.086	74.767	85.448	96.129	106.810

ROLLED MILD STEEL TABLES:

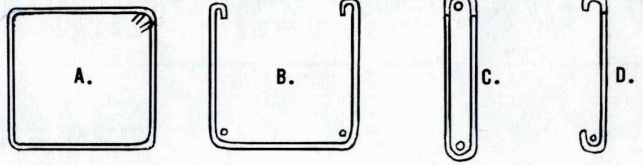
Diameter (Inches)	*Area*	*Weight Per Foot (Pounds)*	*1 Hook (Inches)*	*2 Hooks (Inches)*	*1 Lap 40 D. (Inches)*	*1 Lap 4 Hooks*	*2 Laps 6 Hooks*	*3 Laps 8 Hooks*	*4 Laps 10 Hooks*	*5 Laps 12 Hooks*
1/4	0.049	0.167	2 1/4	4 1/2	10	1' 7"	2'10"	4' 0"	5' 3"	6' 5"
3/8	0.110	0.376	3 1/2	7	15	2' 5"	4' 3"	6' 1"	7'11"	9' 9"
1/2	0.196	0.668	4 1/2	9	20	3' 2"	5' 7"	8' 0"	10' 5"	12'10"
5/8	0.307	1.043	5 3/4	11 1/2	25	4' 0"	7' 1"	10' 1"	13' 2"	16' 2"
3/4	0.442	1.502	6 3/4	13 1/2	30	4' 9"	8' 5"	12' 0"	15' 8"	19' 3"
7/8	0.601	2.044	8	16	35	5' 7"	9'10"	14' 1"	18' 4"	22' 7"
1	0.785	2.670	9	18	40	6' 4"	11' 2"	16' 0"	20'10"	25' 8"
1 1/8	0.994	3.380	10	20	45	7' 1"	12' 6"	17'11"	23' 4"	28' 9"
1 1/4	1.227	4.172	11	22	50	7'10"	13'10"	19'10"	25'10"	31'10"
1 3/8	1.484	5.049	12	24	55	8' 7"	15' 2"	21' 9"	28' 4"	34'11"
1 1/2	1.767	6.088	13 1/4	26 1/2	60	9' 5"	16' 8"	23'10"	31' 1"	38' 3"
1 5/8	2.073	7.051	14 1/2	29	65	10' 3"	18' 1"	25'11"	33' 9"	41' 7"
1 3/4	2.405	8.178	15 1/2	31	70	11' 0"	19' 5"	27'10"	36' 3"	44' 8"
1 7/8	2.761	9.388	16 3/4	33 1/2	75	11'10"	20'11"	29'11"	39' 0"	48' 0"
2	3.141	10.680	17 3/4	35 1/2	80	12' 7"	22' 3"	31'10"	41' 6"	51' 1"

ROLLED MILD STEEL TABLES – *continued*

LENGTH OF BENDS AND HOOKS (INCHES):

Diameter of Rods (Inches)	$\frac{3}{16}$" *Stirrups*				$\frac{1}{4}$" *Stirrups*				$\frac{3}{8}$" *Stirrups*				$\frac{1}{2}$" *Stirrups*				$\frac{5}{8}$" *Stirrups*				$\frac{3}{4}$" *Stirrups*			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	*D*
$\frac{1}{2}$	$6\frac{1}{4}$	$6\frac{5}{8}$	$7\frac{1}{2}$	$7\frac{1}{4}$	$6\frac{1}{8}$	$6\frac{1}{2}$	$7\frac{1}{2}$	$7\frac{3}{8}$	$5\frac{3}{4}$	$6\frac{1}{2}$	$7\frac{3}{4}$	$7\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{4}$	$7\frac{3}{4}$	$7\frac{3}{4}$	–	–	–	–	–	–	–	–
$\frac{5}{8}$	$6\frac{1}{2}$	$7\frac{7}{8}$	$7\frac{7}{8}$	$7\frac{1}{2}$	$6\frac{1}{4}$	$6\frac{7}{8}$	8	$7\frac{5}{8}$	6	$6\frac{5}{8}$	8	$7\frac{7}{8}$	$5\frac{1}{4}$	$6\frac{3}{8}$	8	$7\frac{7}{8}$	$5\frac{1}{4}$	$6\frac{3}{8}$	$8\frac{1}{4}$	$8\frac{1}{8}$	–	–	–	–
$\frac{3}{4}$	$6\frac{5}{8}$	7	$8\frac{1}{8}$	$7\frac{7}{8}$	$6\frac{1}{2}$	7	$8\frac{1}{4}$	8	$6\frac{1}{4}$	$6\frac{3}{4}$	$8\frac{1}{4}$	8	$5\frac{3}{4}$	$6\frac{3}{4}$	$8\frac{1}{2}$	$8\frac{1}{4}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{4}$	$5\frac{1}{4}$	$6\frac{1}{4}$	$8\frac{1}{2}$	$8\frac{1}{2}$
$\frac{7}{8}$	$6\frac{7}{8}$	$7\frac{1}{4}$	$8\frac{1}{2}$	$6\frac{3}{8}$	$6\frac{3}{4}$	$7\frac{1}{8}$	$8\frac{1}{8}$	$8\frac{1}{8}$	$6\frac{1}{4}$	$7\frac{1}{8}$	$8\frac{3}{4}$	$8\frac{3}{8}$	6	$6\frac{7}{8}$	$8\frac{3}{4}$	$8\frac{3}{8}$	$5\frac{3}{4}$	$6\frac{5}{8}$	$8\frac{3}{4}$	$8\frac{5}{8}$	$5\frac{1}{2}$	$6\frac{5}{8}$	9	$8\frac{5}{8}$
1	7	$7\frac{3}{8}$	$8\frac{3}{4}$	$8\frac{3}{8}$	$6\frac{3}{4}$	$7\frac{1}{2}$	9	$8\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{4}$	9	$8\frac{1}{2}$	$6\frac{1}{4}$	7	$9\frac{1}{4}$	$8\frac{3}{4}$	6	7	$9\frac{3}{4}$	$8\frac{3}{4}$	$5\frac{1}{2}$	$6\frac{3}{4}$	$9\frac{1}{4}$	9
$1\frac{1}{8}$	$7\frac{1}{4}$	$7\frac{5}{8}$	$9\frac{1}{8}$	$8\frac{5}{8}$	7	$7\frac{5}{8}$	$9\frac{1}{4}$	$8\frac{5}{8}$	$6\frac{3}{4}$	$7\frac{3}{8}$	$9\frac{1}{4}$	$8\frac{7}{8}$	$6\frac{1}{2}$	$7\frac{3}{8}$	$9\frac{1}{2}$	$8\frac{7}{8}$	6	$7\frac{1}{8}$	$9\frac{1}{2}$	$9\frac{1}{8}$	$5\frac{3}{4}$	$6\frac{7}{8}$	$9\frac{1}{2}$	$9\frac{3}{8}$
$1\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{7}{8}$	$9\frac{1}{2}$	$8\frac{7}{8}$	$7\frac{1}{4}$	$7\frac{3}{4}$	$9\frac{1}{2}$	$8\frac{7}{8}$	7	$7\frac{3}{4}$	$9\frac{3}{4}$	9	$6\frac{1}{2}$	$7\frac{1}{2}$	$9\frac{3}{4}$	$9\frac{1}{4}$	$6\frac{1}{4}$	$7\frac{1}{4}$	$9\frac{3}{4}$	$9\frac{1}{2}$	6	$7\frac{1}{4}$	10	$9\frac{1}{2}$
$1\frac{3}{8}$	$7\frac{5}{8}$	$8\frac{1}{8}$	$9\frac{7}{8}$	$9\frac{1}{8}$	$7\frac{1}{2}$	$8\frac{1}{8}$	10	$9\frac{1}{8}$	7	$7\frac{7}{8}$	10	$9\frac{3}{8}$	$6\frac{3}{4}$	$7\frac{5}{8}$	10	$9\frac{5}{8}$	$6\frac{1}{2}$	$7\frac{5}{8}$	$10\frac{1}{4}$	$9\frac{1}{8}$	$6\frac{1}{4}$	$7\frac{3}{8}$	$10\frac{1}{4}$	$7\frac{7}{8}$
$1\frac{1}{2}$	$7\frac{3}{4}$	$8\frac{3}{8}$	$10\frac{1}{4}$	$9\frac{3}{8}$	$7\frac{1}{2}$	$8\frac{1}{4}$	$10\frac{1}{4}$	$9\frac{1}{2}$	$7\frac{1}{4}$	8	$10\frac{1}{2}$	$9\frac{3}{4}$	7	8	$10\frac{1}{2}$	$9\frac{3}{4}$	$6\frac{3}{4}$	$7\frac{3}{4}$	$10\frac{1}{2}$	10	$6\frac{1}{2}$	$7\frac{1}{2}$	$10\frac{1}{2}$	10

Lengths of Stirrups – for total length of stirrups add lengths of straight (outside to outside of stirrups) to lengths tabulated for bends and hooks.



ROLLED MILD STEEL TABLES – *continued*

H.R.C. REINFORCING MESH:

Available in sheets 14'4" x 7' and 12'6" x 4' and in special sizes by arrangements.

Type	*Spacing of Wires*		*Gauge*		*Weight Per Square Yard*	*Weight Pounds Per 1,000 Square Feet of Area*
	Longitudinal (Inches)	*Transverse (Inches)*	*Longitudinal*	*Transverse*		
34 – 3/02	3	4	3/0	2	18.74	2082
34 – 1/02	3	4	1/0	2	15.58	1731
36 – 1/02	3	6	1/0	2	13.76	1528
35 – 22	3	5	2	2	11.56	1284
34 – 33	3	4	3	3	10.70	1188
66 – 1	6	6	1	1	8.65	961
66 – 2	6	6	2	2	7.32	813
66 – 3	6	6	3	3	6.10	677
66 – 4	6	6	4	4	5.17	574
66 – 5	6	6	5	5	4.32	480
66 – 6	6	6	6	6	3.54	393
66 – 8	6	6	8	8	2.46	273
66 – 10	6	6	10	10	1.58	175
333	3	3	3	3	12.20	1355
334	3	3	4	4	10.34	1148
335	3	3	5	5	8.64	960
338	3	3	8	8	4.92	546

COMPARISONS WITH H.R.C. ROUND RODS:

H.R.C. 663 = $\frac{1}{2}$" at 16" centres or $\frac{3}{8}$" at 9" centres.

H.R.C. 664 = $\frac{1}{2}$" at 19" centres or $\frac{3}{8}$" at 10" centres.

H.R.C. 665 = $\frac{1}{2}$" at 24" centres or $\frac{3}{8}$" at 12" centres.

H.R.C. 666 = $\frac{3}{8}$" at 16" centres.

H.R.C. 668 = $\frac{3}{8}$" at 22" centres.

H.R.C. 6610 = $\frac{3}{8}$" at 33" centres.

ROLLED MILD STEEL TABLES - *continued*

B.R.C. FABRIC - PROPERTIES:

Reference Number	*Spacing of Wires*		*Gauge*		*Weight Per Square Yard (Pounds)*
	Longitudinal (Inches)	*Transverse (Inches)*	*Longitudinal S.W.G.*	*Transverse S.W.G.*	
1	3	16	4/0	4	16.35
2	3	16	3/0	4	14.27
3	3	16	2/0	6	12.31
4	3	16	1/0	6	10.76
5	3	16	1	6	9.32
6	3	16	2	7	7.88
7	3	16	3	8	6.57
8	3	12	4	9	5.67
9	3	12	5	10	4.71
10	3	12	6	10	3.94
11	3	12	7	8	3.35
12	3	12	8	12	2.72
13	3	12	9	12	1.83
14	3	12	10	10	1.12
61	6	6	1	1	8.65
62	6	6	2	2	7.32
63	6	6	3	3	6.10
64	6	6	4	4	5.17
65	6	6	5	5	4.32
66	6	6	6	6	3.54
610	6	6	10	10	1.58
1210	12	12	10	10	-
655	6	6	5	5	-
636	3	10	6	6	-
98	9	10	8	8	-

ROLLED MILD STEEL TABLES – *continued*

WEIGHTS PER 100 SQUARE FEET OF REINFORCING RODS:

Nominal Size (Inches)	*Weight Per Foot (Pounds)*	*Spacing (Inches)*							
		4	*5*	*6*	*8*	*12*	*16*	*20*	*24*
$\frac{1}{4}$	0.17	51	40.4	34	25.5	17.0	12.8	10.1	8.5
$\frac{3}{8}$	0.38	114	91.2	76	57.0	38.0	28.5	22.8	19.0
$\frac{1}{2}$	0.68	204	163.2	136	102	68	51	40.8	34
$\frac{5}{8}$	1.06	318	254.4	212	159	106	79.5	63.6	53
$\frac{3}{4}$	1.52	456	364.8	304	228	152	114	109.2	76
$\frac{7}{8}$	2.07	621	596.8	414	310.5	207	155.8	149.2	103.5
1	2.70	810	648	540	405	270	205.5	162	135

ROLLED MILD STEEL TABLES – *continued*

H.R.C. WELDED REINFORCING FOR CONCRETE:

STANDARD SIZES 12'6" x 4':

Reference Number	*Spacing of Wires*		*Gauge*		*Contents of Bundle (Sheets)*
	Longitudinal (Inches)	*Transverse (Inches)*	*Longitudinal*	*Transverse*	
665	6	6	5	5	5
6125	6	12	5	5	5
995	9	9	5	5	5
12125	12	12	5	5	5
338	3	3	8	8	5
368	3	6	8	8	5
398	3	9	8	8	5
3128	3	12	8	8	5
668	6	6	8	8	5
6128	6	12	8	8	5
998	9	9	8	8	5
12128	12	12	8	8	5
3310	3	3	10	10	10
3610	3	6	10	10	10
3910	3	9	10	10	10
1210	3	12	10	10	10
6610	6	6	10	10	10
61210	6	12	10	10	10
9910	9	9	10	10	10
121210	12	12	10	12	10
3312	3	3	12	12	10
3612	3	6	12	10	10
3912	3	9	12	12	10
31212	3	12	12	12	10
6612	6	6	12	12	10
3314	3	3	14	14	20

WEIGHTS OF METAL RODS:

POUNDS/FEET:

Diameter in Inches	Mild Steel			Brass			Phosphor-Bronze		Gunmetal		Aluminium		Copper		Wrought Iron	
	Round	Square	Hexagon	Round	Square	Hexagon	Round	Hexagon	Round	Hexagon	Round	Hexagon	Round	Square	Round	Square
1/8	0.042	0.053	0.046	0.045	0.058	0.050	0.0457	0.0505	0.0454	0.050	0.014	0.016	0.047	0.06	0.041	0.052
3/16	0.094	0.120	0.1035	0.103	0.130	0.113	0.103	0.1138	0.1022	0.1127	0.032	0.036	0.106	0.135	0.092	0.117
1/4	0.167	0.212	0.1838	0.182	0.232	0.201	0.183	0.2018	0.1815	0.200	0.058	0.064	0.189	0.240	0.164	0.208
5/16	0.261	0.332	0.287	0.284	0.362	0.313	0.286	0.315	0.283	0.312	0.09	0.995	0.294	0.376	0.256	0.326
3/8	0.376	0.478	0.414	0.410	0.521	0.452	0.412	0.455	0.408	0.451	0.13	0.143	0.424	0.541	0.368	0.469
7/16	0.511	0.651	0.564	0.557	0.710	0.615	0.571	0.618	0.556	0.613	0.177	0.195	0.578	0.736	0.501	0.638
1/2	0.668	0.850	0.735	0.728	0.927	0.803	0.733	0.808	0.726	0.801	0.231	0.255	0.755	0.962	0.654	0.833
9/16	0.845	1.076	0.930	0.921	1.17	1.02	0.928	1.02	0.920	1.013	0.292	0.322	0.955	1.21	0.828	1.055
5/8	1.043	1.328	1.148	1.14	1.45	1.25	1.144	1.26	1.134	1.249	0.361	0.398	1.18	1.51	1.023	1.302
11/16	1.262	1.607	1.39	1.38	1.75	1.52	1.385	1.525	1.373	1.513	0.436	0.481	1.43	1.82	1.237	1.576
3/4	1.502	1.913	1.65	1.64	2.09	1.81	1.646	1.815	1.632	1.8	0.519	0.574	1.70	2.16	1.473	1.875
13/16	1.763	2.245	1.943	1.92	2.45	2.12	1.937	2.133	1.92	2.115	0.609	0.676	1.99	2.54	1.728	2.201
7/8	2.044	2.603	2.25	2.23	2.84	2.46	2.242	2.45	2.225	2.47	0.707	0.875	2.31	2.95	2.004	2.552
15/16	2.347	2.988	2.585	2.56	3.26	2.82	2.574	2.835	2.55	2.81	0.814	0.937	2.65	3.38	2.301	2.930

WEIGHTS OF METAL RODS – *continued*

POUNDS/FEET:

Diameter in Inches	*Mild Steel*			*Brass*			*Phosphor-Bronze*		*Gunmetal*		*Aluminium*		*Copper*		*Wrought Iron*	
	Round	*Square*	*Hexagon*	*Round*	*Square*	*Hexagon*	*Round*	*Hexagon*	*Round*	*Hexagon*	*Round*	*Hexagon*	*Round*	*Square*	*Round*	*Square*
1	2.670	3.400	2.94	2.91	3.71	3.21	2.93	3.228	2.905	3.20	0.923	1.01	3.02	3.85	2.618	3.333
1 1/8	3.380	4.303	3.72	3.69	4.69	4.06	3.71	4.09	3.68	4.06	1.17	1.288	3.83	4.87	3.313	4.219
1 1/4	4.172	5.313	4.60	4.55	5.79	5.02	4.58	5.05	4.54	5.01	1.44	1.592	4.73	6.01	4.091	5.208
1 3/8	5.049	6.428	5.56	5.51	7.01	6.07	5.54	6.10	5.50	6.05	1.75	1.930	5.72	7.77	4.950	6.302
1 1/2	6.008	7.650	6.62	6.55	8.34	7.22	6.59	7.26	6.54	7.20	2.08	–	6.80	8.65	5.890	7.500
1 5/8	7.051	8.978	7.80	7.69	9.79	8.48	7.76	8.55	7.69	8.48	2.704	–	7.99	10.16	6.913	8.802
1 3/4	8.178	10.41	9.01	8.92	11.4	9.83	8.98	9.89	8.90	9.81	2.83	–	9.26	11.78	8.018	10.208
1 7/8	9.388	11.95	10.35	10.2	13.0	11.3	10.31	11.36	10.22	11.26	3.256	–	10.63	13.52	9.204	11.719
2	10.68	13.60	11.78	11.6	14.8	12.8	11.72	12.91	11.62	12.8	3.692	–	12.10	15.39	10.472	13.333

METAL TUBES AND PIPES:

CALCULATION OF SANITARY PIPE SIZES:

Each pipe size is given a conversion factor:

½	inch pipe has a factor of	4
¾	inch pipe has a factor of	11
1	inch pipe has a factor of	23
1¼	inch pipe has a factor of	40
1½	inch pipe has a factor of	63
2	inch pipe has a factor of	128
2½	inch pipe has a factor of	224
3	inch pipe has a factor of	353
4	inch pipe has a factor of	724.

Example of Use -

Say there are 2 - ½ inch and 3 - ¾ inch branches required on one main. Then take twice the factor for ½ inch pipe (4) and add on three times the factor for ¾ inch pipe (11):

i.e. (2 x 4) + (3 x 11) = 8 + 33 = 41.

Look up the above table to see which pipe size has a factor of 41 or over - a 1¼ inch pipe has a factor 40 to 62 therefor this is the pipe size to use.

COMPOSITION GAS PIPES:

Internal Diameter (Inches)	*Weight Per Yard*	
	(Pounds)	*(Ounces)*
1/4	–	12
3/8	1	1
3/8 heavy	1	4
1/2	1	4
1/2 heavy	2	–
5/8	2	1
5/8 heavy	2	12
3/4	2	6
3/4 heavy	3	1
1	3	1
1 heavy	4	12
1 1/2	6	12

GRADIENT OF DRAINS:

Nature of Drain	*Diameter of Pipe (Inches)*	*Gradient*
Drains other than stormwater drains	4	Not less than 1 foot in 40 feet
	6	Not less than 1 foot in 100 feet
Stormwater drains	4	Not less than 1 foot in 80 feet
	6	Not less than 1 foot in 200 feet
	9	Not less than 1 foot in 350 feet
	12	Not less than 1 foot in 500 feet
	15	Not less than 1 foot in 700 feet
	18	Not less than 1 foot in 900 feet
	21	Not less than 1 foot in 1,100 feet
	24	Not less than 1 foot in 1,300 feet

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS:

From the Technical Bulletin No.51:

There is no doubt that at present the simplest, most trouble free and generally the most economical method of heating water for domestic purposes in New Zealand is by means of the electric immersion element. This position has remained for some years, and in consequence most New Zealand manufacturers, aided by an excellent Standard Specification, do produce an article that is efficient, well designed, and well made.

Basically of course an electric water heater is no more than an immersion element in a watertight container, but this may take diverse forms. Over the years however a multitude of designs has become reduced to half a dozen or so well defined types, from which it is possible to select one to fit almost any situation. The purpose of this article is to point out the differences between the various types, to indicate diagrammatically the fundamentals of installation procedure, and to explain their limitations. It is not claimed that the types described in the following pages are the only ones obtainable, nor that the suggested pipe-running systems are the only ones possible, but the article will act as a guide to the installation of those types most commonly met with.

The New Zealand Standard Specification for the construction, casing, and lagging of electrically heated hot water storage cylinders is N.Z.S.S. 720; its title is *Thermal Storage Electric Water Heaters.* Associated with it is N.Z.S.S. 917, which is the installation specification for N.Z.S.S. 720 cylinders.

PRESSURE TYPE –

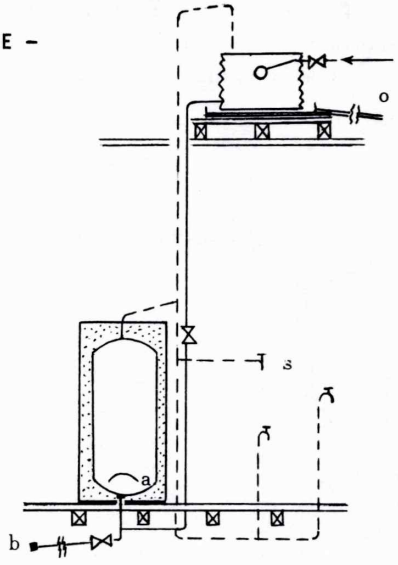
This is the type installed in most residences in New Zealand for the purpose of providing hot water to all draw-off points.

The term 'pressure' might be taken to imply that the cylinder is connected directly to the high pressure mains, but as you will see from the diagrams, such is not the case. A 'pressure' type must be supplied with water from a supply tank, or via a pressure-reducing valve. It will assist the flow from the taps if the supply tank is mounted as high as practicable. The portion of the draw-off pipe just above the cylinder should be almost horizontal; this will allow the cylinder to expand and contract with a minimum of restraint. It is usual to return the vent over the supply tank, but it may be extended through the roof if it is more convenient that way; the reverse usually applies. The letter (a) inside the cylinder identifies the baffle which prevents a jet of cold water from 'short circuiting' the cylinder by boring straight through from inlet to outlet.

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS – *continued*

At the lowest point of the system is a drain or sludge pipe, at the end of which is a screwed brass cap (b). The sludge pipe may be either capped or valved as shown, but it is not necessary to do both.

PRESSURE TYPE –



In any purely electrically heated 'pressure' installation the capacity of the supply tank must be at least half that of the cylinder. The supply tank is seated in a tray, and from the tray an overflow pipe (o) is taken to discharge into the open air.

Pressure type cylinders are obtainable in a great variety of capacities ranging from 10 to 200 gallons, and in the 20 to 60 gallon range there is also a wide choice between tall cylinders of small diameter and squat ones of larger diameter.

They are thermostatically controlled to hold the temperature of the water at about 160°F.

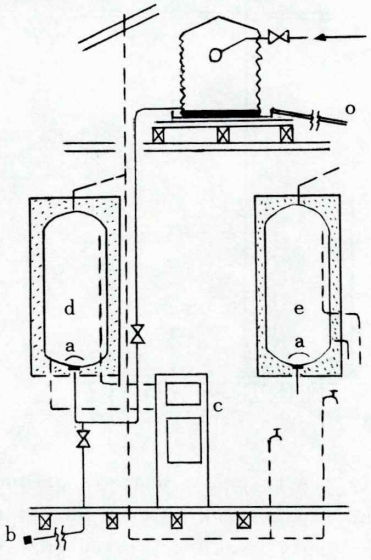
PRESSURE TYPE: DUAL FUEL-ELECTRIC –

In the diagram (c) indicates a small independent boiler, variously known as a chip heater, destructor, or incinerator. It is connected to the cylinder by circulating pipes which may enter the cylinder as shown in (d) or (e); (d), which is bottom entry, is preferred. Circulating pipes should be not less than one inch bore for 30 and 40 gallon cylinders. They must not be valved. The vent pipe must be at least three quarters on an inch in diameter and must be carried through the roof to terminate not less than two feet above the supply tank for a single

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS – *continued*

storey house. The supply tank must have a capacity of not less than half that of the cylinder with a minimum of 30 gallons. The bottom of the cylinder casing must not be lower than the top of the boiler, and it is advisable to place boiler and cylinder as close as possible. If they must be spaced apart it is better to try to keep them within a horizontal distance of about 15 feet. Note that the cylinder has an internal flow pipe.

PRESSURE DUAL FUEL-ELECTRIC –



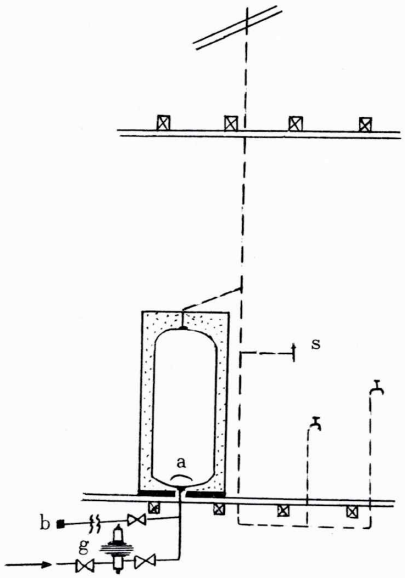
With those few exceptions, installation follows the pattern already described.

PRESSURE TYPE WITH PRESSURE REDUCING VALVE –

The cylinder is identical with that of the ordinary pressure type, but it is supplied with water through a pressure-reducing valve (g). The vent must be at least three quarters of an inch in diameter and must rise to a height of not less than ten feet above the highest outlet served by the hot water system. Local Authorities in some districts will not permit the use of pressure reducing valves, while in other districts they are used almost exclusively. There are several reliable valves of New Zealand manufacture on the market.

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS – *continued*

PRESSURE TYPE WITH PRESSURE REDUCING VALVE –



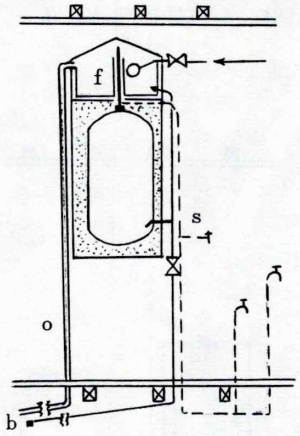
The initial cost of a hot water system using a supply tank is somewhat greater than that of a pressure-reducing valve system, but it is incontrovertible that the former has several points of superiority, not the least of which is the ability to provide a better draw-off rate. Nevertheless the pressure-reducing valve is by no means to be despised; it is particularly useful in the case of buildings with flat roofs and low stud heights.

CISTERN OR COMBINED TYPE –

This type incorporates its own supply tank, which is (or should be) thermally insulated from the cylinder; provided that one is aware of its limitations it can be a very useful and convenient appliance. To obtain as good a flow from taps as possible, the whole assembly must be mounted as high as possible consistent with having a minimum clearance of nine inches below the ceiling for access to the ball valve. Unless pipe runs from the heater to the draw-off points are very short, this limitation on the height at which it can be fixed in the average house may result in rather meagre flows from bath and sinks taps. To obtain even a passable flow from a shower the top edge of the cistern should be at least five feet above the shower head.

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS - *continued*

CISTERN OR COMBINED TYPE -



Do not forget to fit a sludge pipe at the bottom of the heater, and to provide an overflow pipe from the cistern. Some local authorities ask for a tray and overflow pipe beneath the heater, but this requirement is not universal.

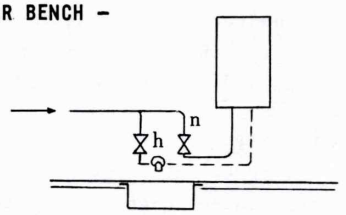
As in the pressure type, the temperature of the water is thermostatically controlled. Capacities from ten to 150 gallons are available.

PUSH THROUGH TYPES -

Speaking in general terms, 'push through' heaters are designed to be connected directly to the high pressure supply, and to serve one outlet only. The exceptions to this rule will be dealt with briefly later. The term 'push through' refers to the fact that in both the over bench and under bench models the cold water is led in to the bottom of the cylinder and in effect pushes the hot water out of the top. Practically all water heaters work on the same principle, but perhaps being connected directly to the high pressure supply makes it more obvious in this type. There is one significant difference that must be observed when installing these water heaters, i.e. the water outlet must be incapable of being closed off. The reason for this is that if the outlet could be closed the cylinder would be subjected to full water mains pressure, which might exceed 100 pounds per square inch, and a cylinder capable of withstanding such a pressure would be so costly to produce that it would be beyond the means of the average home owner.

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS - *continued*

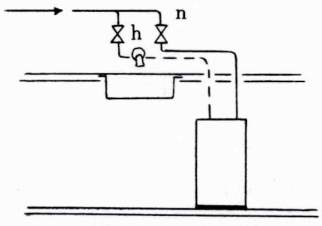
PUSH THROUGH OVER BENCH -



floor

If you will look at the two 'push through' diagrams you will see that there are two stop-cocks and an outlet (h) grouped symmetrically above the sink or other fixture. The outlet may be either a fixed or swinging type of faucet; it is suggested that the latter has advantages. The stop-cock on the left will obviously control the cold water discharge from the faucet. When the right hand stop-cock is opened, cold water enters at the bottom of the cylinder as previously described, and hot water will be discharged at the faucet. In spite of the permanently open outlet, if the right hand stop-cock were to be opened fully, the mains water would still exert considerable pressure on the cylinder, and for that reason it is customary and necessary to provide a restrictor in the path of the high pressure water; this is indicated at (n). One firm produces an ingenious type of restrictor that is incorporated in the stop-cock. Push through water heaters are obtainable in a great variety of sizes ranging from one to thirty gallons, but the greatest use is made of those in the three to ten gallon range.

PUSH THROUGH UNDER BENCH -



INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS - *continued*

A push through water heater may be made to serve two outlets by means of a three-way cock, but such an arrangement can be regarded as an improvisation, and is not recommended.

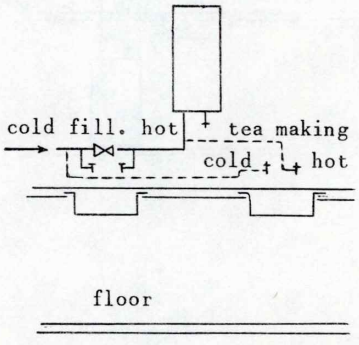
On the other hand if it is fed by a supply tank and provided with a vent it may serve several points - but of course it is then a miniature pressure type, and no longer a push through.

Push through heaters are thermostatically controlled.

BOILING TYPE -

The boiling type differs from the types so far described in many ways. In the standard cylinder filling is not automatic; it is not essential to fill it to any particular level; it is not thermostatically controlled. Do not confuse this type with Boiling Units Nos.1 and 2, because they are very different. Boiling type water heaters are designed primarily for tea making, but they may be used also to supply taps in the usual way. Boiling type water heaters are equipped with immersion element, gauge glass, and whistle, and on request may be supplied also with overfill cut-off and automatic steam switch. It is also possible to incorporate features such as automatic filling and thermostatic control, but this is not standard. Each cylinder has a tea making tap. If it is to be used only for tea making its installation will be simple - it may be connected up to the high pressure supply with stop-cock control and apart from that needs only the electric connection. If it is desired to serve taps over fixtures it may be connected up as shown in the diagram (solid lines for one sink, broken line for an additional one). The taps are ordinary bib-cocks. To fill the cylinder, open the stop cock located between the two taps, and close it when the water has reached the desired height as shown by the gauge glass. To draw off hot water for either sink, open the right hand tap.

BOILING TYPE -



INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS – *continued*

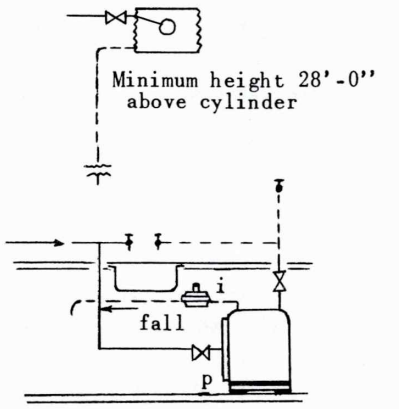
Boiling type cylinders are obtainable in capacities ranging from one and a half to 30 gallons.

BOILING UNITS (CONTINUOUS TYPE) –

Although this heading may give the impression that these water heaters are boiling continuously, that is not correct; but they will permit a more or less continuous draw-off of water at or about 212°F. They are designed primarily for use in cafeterias and similar situations in which a supply of water at or near boiling temperature is required spread over a period of time. Its application thus differs from that of the boiling type so far described, which will more satisfactorily deliver a large quantity in a short time.

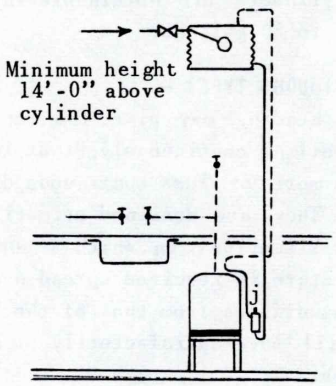
Essentially there is little difference between units 1 and 2, but No.1 is usually connected to high pressure supply, and No.2 to a supply tank at an elevation of at least 14 feet above the cylinder. If No.1 is connected to a supply tank, the latter must be at least 28 feet above the cylinder. Water at atmospheric pressure boils at 212°F, but with increased pressure the boiling point is raised. Pressures in these boiling units are therefore a few pounds above atmospheric, and water at slightly above 212°F is held without ebullition; it thus retains most of its dissolved oxygen and tea made with it is more palatable than would be the case if it were constantly boiling.

BOILING UNIT (CONTINUOUS TYPE) No.1 –



INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS – *continued*

BOILING UNIT (CONTINUOUS TYPE) No.2 –



In both 1 and 2, the electrical loading and the rate at which water can enter the cylinder are so related that only water at the correct temperature can be drawn off.

No.1 is controlled by pressure switch (p) and No.2 by thermostatic valve (j).

In addition to inlet and outlet pipes No.1 requires a relief valve (i) to which is connected an outlet pipe discharging in such a position that in the event of the valve opening, steam or hot water may be ejected safely.

Although it is possible to take a branch off to serve a sink, or sinks, as shown on the diagrams, this is not recommended. Better to restrict these heaters to their special function of providing boiling water for tea or coffee, and install a pressure or push-through type for dish-washing and culinary purposes.

The standard capacity for No.1 is 12 and a half gallons, and for No.2, 5, 10, and 15 gallons, but specials of either 1 or 2 can be made if necessary.

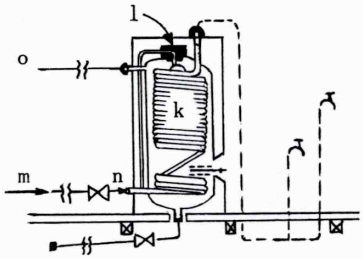
INDIRECT TYPE –

The indirect type is very different in principle from any of the foregoing, in that the water that is directly heated by the immersion element is not drawn off, but remains in the cylinder. Inside the cylinder is a coil of copper pipe (k), which by virtue of its large surface area picks up the heat from the water in the cylinder, and transfers it to the water in the coil. The coil is connected at the lower end (m) to mains pressure supply, and from the top of the coil a pipe is carried to the usual hot water draw-off points. The water in the coil being at water mains

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS - *continued*

pressure, which is usually between 60 and 80 p.s.i., there is ample head or pressure to force the hot water in the coil to the draw-off points, even though they may be thirty or forty feet from the cylinder. This should not be taken to imply that it is considered good practice to employ long runs of hot water piping, since it involves wastage of heat and therefore of electricity. Nevertheless occasions do arise when long runs cannot be avoided.

INDIRECT TYPE -



The chief disadvantage of this type is that the process of transference of heat from the water in the cylinder to water in the coil takes time, and it is possible therefore to draw off high temperature water (say 160°F) at a low rate of flow, or tepid water at a high rate of flow, but not hot water at a high rate. So in order to be sure of hot water and therefore a low flow rate, it is necessary to fit a restrictor (n) on the coil side of the stop cock.

Although this low flow rate willl often be a disadvantage, there are cases in which it may be acceptable, and one of these is the hot water supply to a shower. In single storey houses particularly it is frequently difficult to obtain sufficient pressure at the shower rose to provide an adequate shower, even though the required rate of flow is no more than about 2 g.p.m. The indirect cylinder can fill this requirement admirably.

No water is drawn directly from the cylinder, but it is inevitable that some will be lost by evaporation, and some means must be provided to maintain the water at its proper level. In the one New Zealand made example of the indirect cylinder, until very recently make-up water was provided by means of a stainless steel needle valve (l), but it is understood that the most recent models employ a miniature integral supply tank for this purpose.

INSTALLATION OF THERMAL STORAGE ELECTRIC WATER HEATERS - *continued*

The cylinder must have a vent and overflow pipe (o) discharging into the open air, and fixed with a continuous fall from the cylinder.

Indirect electric water heaters are obtainable in several sizes between 30 and 100 gallons capacity inclusive.

LEAD PIPES:

Inside Diameter (Inches)	*Weight Per Yard (Pounds)*	*Thickness of Wall (Inches)*
$\frac{1}{2}$	3	$\frac{3}{32}$
$\frac{1}{2}$	7	$\frac{1}{4}$
$\frac{1}{2}$	9	$\frac{5}{16}$
$\frac{3}{4}$	5	$\frac{7}{64}$
$\frac{3}{4}$	9	$\frac{3}{16}$
$\frac{3}{4}$	11	$\frac{1}{4}$
1	6	$\frac{1}{8}$
1	9	$\frac{3}{16}$
$1\frac{1}{4}$	8	$\frac{1}{8}$
$1\frac{1}{4}$	12	$\frac{3}{16}$
$1\frac{1}{2}$	17	$\frac{1}{4}$
$1\frac{1}{2}$	16	$\frac{1}{4}$
2	16	$\frac{3}{16}$
2	20	$\frac{5}{32}$
2	28	$\frac{1}{4}$

LEAD SOIL PIPES:

Internal Diameter (Inches)	*Equal to Sheet Lead (Pounds)*	*Weight Per Yard*	
		(Pounds)	*(Ounces)*
$1\frac{1}{4}$	5	5	–
$1\frac{1}{4}$	$5\frac{1}{2}$	5	12
$1\frac{1}{4}$	6	6	9
$1\frac{1}{2}$	5	5	12
$1\frac{1}{2}$	$5\frac{1}{2}$	7	–
$1\frac{1}{2}$	6	7	8
$1\frac{1}{2}$	7	8	8
$1\frac{3}{4}$	6	8	8
2	$5\frac{1}{2}$	8	12
2	6	10	–
2	7	11	–
2	8	12	–
$2\frac{1}{2}$	$5\frac{1}{2}$	10	–
$2\frac{1}{2}$	6	11	4
$2\frac{1}{2}$	7	13	–
3	$5\frac{1}{2}$	13	–
3	6	14	4
3	7	15	8
3	8	18	8
$3\frac{1}{2}$	$5\frac{1}{2}$	16	–
$3\frac{1}{2}$	7	20	8
4	$5\frac{1}{2}$	16	12
4	6	19	–
4	7	21	8
4	8	24	6
$4\frac{1}{2}$	8	24	–
5	8	30	–
$5\frac{1}{2}$	8	–	–

SIZES OF STEEL TUBES:

Nominal Bore (Inches)	Approximate Outside Diameter (Inches)	Outside Diameter of Black Tube				Thicknesses						Ordinary Sockets	
		Light		Medium and Heavy		Light		Medium		Heavy		Approximate O.D.	Minimum Length
		Maximum (Inches)	Minimum (Inches)	Maximum (Inches)	Minimum (Inches)	S.W.G.	(Inches)	S.W.G.	(Inches)	S.W.G.	(Inches)	(Inches)	(Inches)
1/8	13/32	0.396	0.383	0.411	0.386	15	0.072	14	0.080	12	0.104	19/32	3/4
1/4	17/32	0.532	0.518	0.547	0.522	15	0.072	13	0.092	11	0.116	3/4	1
3/8	11/16	0.671	0.656	0.685	0.660	15	0.072	13	0.092	11	0.116	29/32	1 1/8
1/2	27/32	0.841	0.825	0.856	0.831	14	0.080	12	0.104	10	0.128	1 3/32	1 1/2
3/4	1 1/16	1.059	1.041	1.072	1.047	13	0.092	12	0.104	10	0.128	1 11/32	1 5/8
1	1 11/32	1.328	1.309	1.346	1.316	12	0.104	10	0.128	8	0.160	1 21/32	1 7/8
1 1/4	1 11/16	1.670	1.650	1.687	1.657	12	0.104	10	0.128	8	0.160	2 1/32	2 1/8
1 1/2	1 29/32	1.903	1.882	1.919	1.889	11	0.116	10	0.128	8	0.160	2 9/32	2 1/4
2	2 3/8	2.370	2.347	2.394	2.354	11	0.116	9	0.144	7	0.176	2 29/32	2 1/2
2 1/2	3	2.991	2.960	3.014	2.969	10	0.128	9	0.144	7	0.176	3 7/16	2 3/4
3	3 1/2	3.491	3.460	3.524	3.469	10	0.128	8	0.160	6	0.192	4	3
3 1/2	4	3.981	3.950	4.019	3.959	9	0.144	8	0.160	6	0.192	4 1/2	3 1/2
4	4 1/2	4.481	4.450	4.524	4.459	9	0.144	7	0.176	5	0.212	5 1/16	3 1/2
5	5 1/2	–	–	5.534	5.459	–	–	6	0.192	5	0.212	6 1/8	3 3/4
6	6 1/2	–	–	6.539	6.459	–	–	6	0.192	5	0.212	7 1/4	3 3/4

SIZES, WEIGHTS AND GAUGES OF LIGHT GAUGE COPPER TUBE:

WATER AND GAS:

Nominal Size (Inches)	*Thickness S.W.G.*	*Approximate Weight (Pounds Per Foot)*
$\frac{1}{8}$	22	0.06
$\frac{3}{16}$	21	0.09
$\frac{1}{4}$	20	0.135
$\frac{3}{8}$	20	0.19
$\frac{1}{2}$	19	0.27
$\frac{3}{4}$	19	0.39
1	19	0.50
1	18	0.62
$1\frac{1}{4}$	18	0.76
$1\frac{1}{2}$	18	0.91
2	17	1.40
$2\frac{1}{2}$	17	1.74
3	16	2.38
$3\frac{1}{2}$	15	3.12
4	14	3.97

SANITATION:

Nominal Size (Inches)	*Thickness S.W.G.*	*Approximate Weight (Pounds Per Foot)*
1	19	0.50
1	18	0.62
$1\frac{1}{4}$	18	0.76
$1\frac{1}{2}$	18	0.91
2	18	1.21
$2\frac{1}{2}$	18	1.50
3	17	2.09
$3\frac{1}{2}$	17	2.44
4	16	3.19

SYSTEMS OF DOMESTIC WASTE DISPOSAL:

From the Technical Bulletin, No.65:

Although most methods by which water-borne wastes from sanitary fixtures may be removed from a building are adequately covered in the 'Drainage and Plumbing Regulations 1959' (and Amendments), they are not shown graphically, neither do the Regulations describe the various systems under the titles by which they are commonly known.

In order to make clear the points of difference between the systems, this article will present them diagrammatically, will describe the cardinal features of each method, and give some guidance on the choice of system for a particular situation.

Before proceeding to describe them in detail however we must define terms that will appear frequently in the following pages.

Soil pipe means any pipe which is not embedded in the ground, and which conveys the discharge from any water closet* to any drain. (As will be shown in the text, in certain circumstances soil pipes may carry the discharge from fittings other than W.C.'s.)

Waste pipe – a pipe intended to carry only the discharge from sanitary fixtures other than W.C. pans*; i.e. sinks, basins, showers, tubs, etc.

Vent pipe and/or *anti-siphon vent pipe* – a pipe open to the outside air at one end, while the other end is joined close to the trap of a soil or waste pipe system, primarily for the purpose of maintaining the system at or close to atmospheric pressure, with the aim of preventing loss of seal from traps by siphonage.

Trap – a device so contrived that it will hold a water which, while preventing the passage of air or gas, will permit the free flow of water.

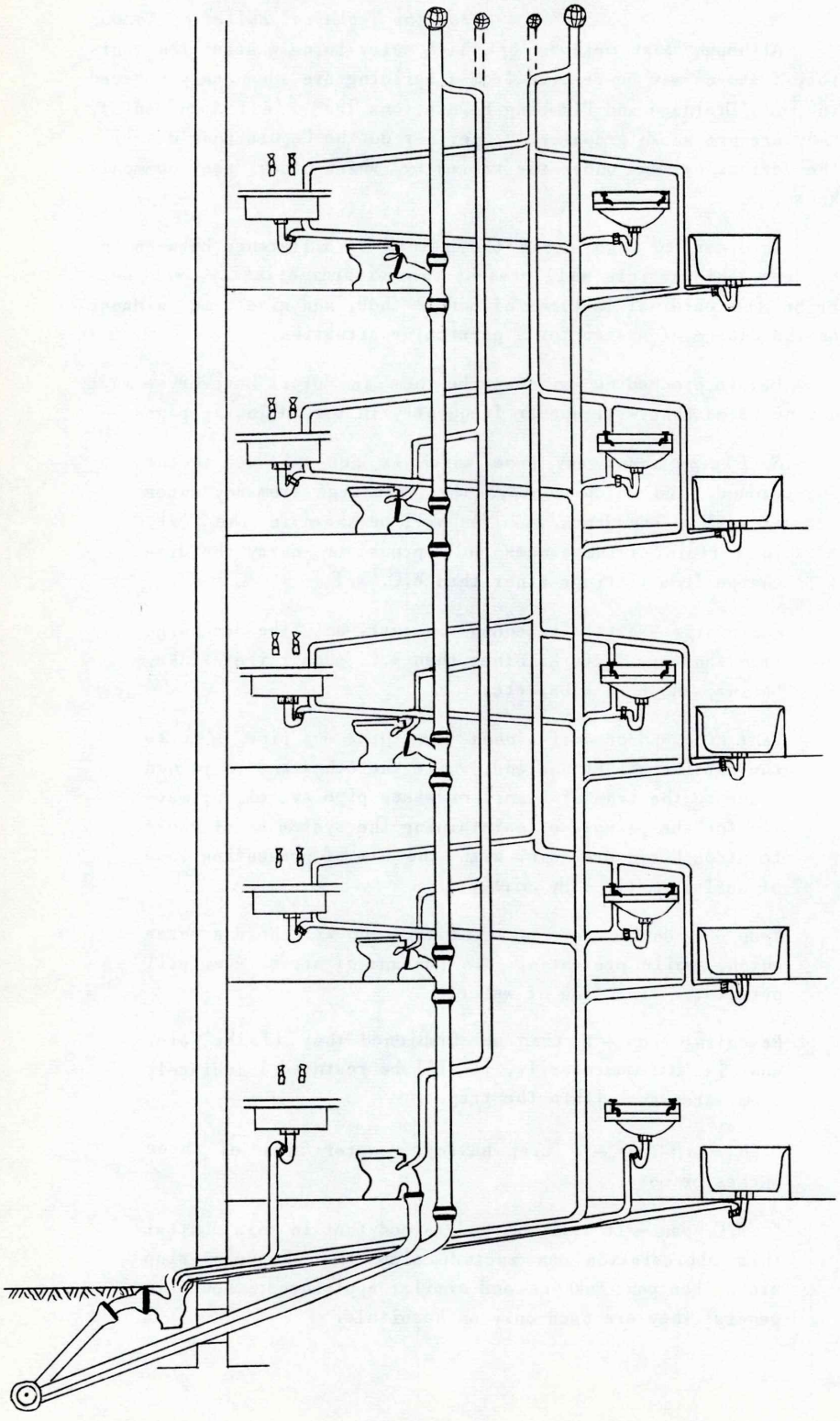
Resealing trap – a trap so fashioned that if the water seal is lost momentarily, it will be restored immediately from waterways within the trap.

Deep seal trap – a trap having a water seal of three inches or more.

* W.C. pan – it will be understood that in this context this abbreviation can include also slop hoppers, slop sinks, bed pan washers and similar appliances, though in general they are used only on hospitals.

SYSTEMS OF DOMESTIC WASTE DISPOSAL - *continued*

TWO PIPE ORIGINAL -



SYSTEMS OF DOMESTIC WASTE DISPOSAL – *continued*

TWO PIPE OR DUAL PIPE ORIGINAL –

Until about forty years ago this was the only system permitted and commonly used in most English-speaking countries. It is called 'two pipe' because the soil carriage system is entirely separate from the waste carriage system, as may be seen from inspection of the accompanying diagram.

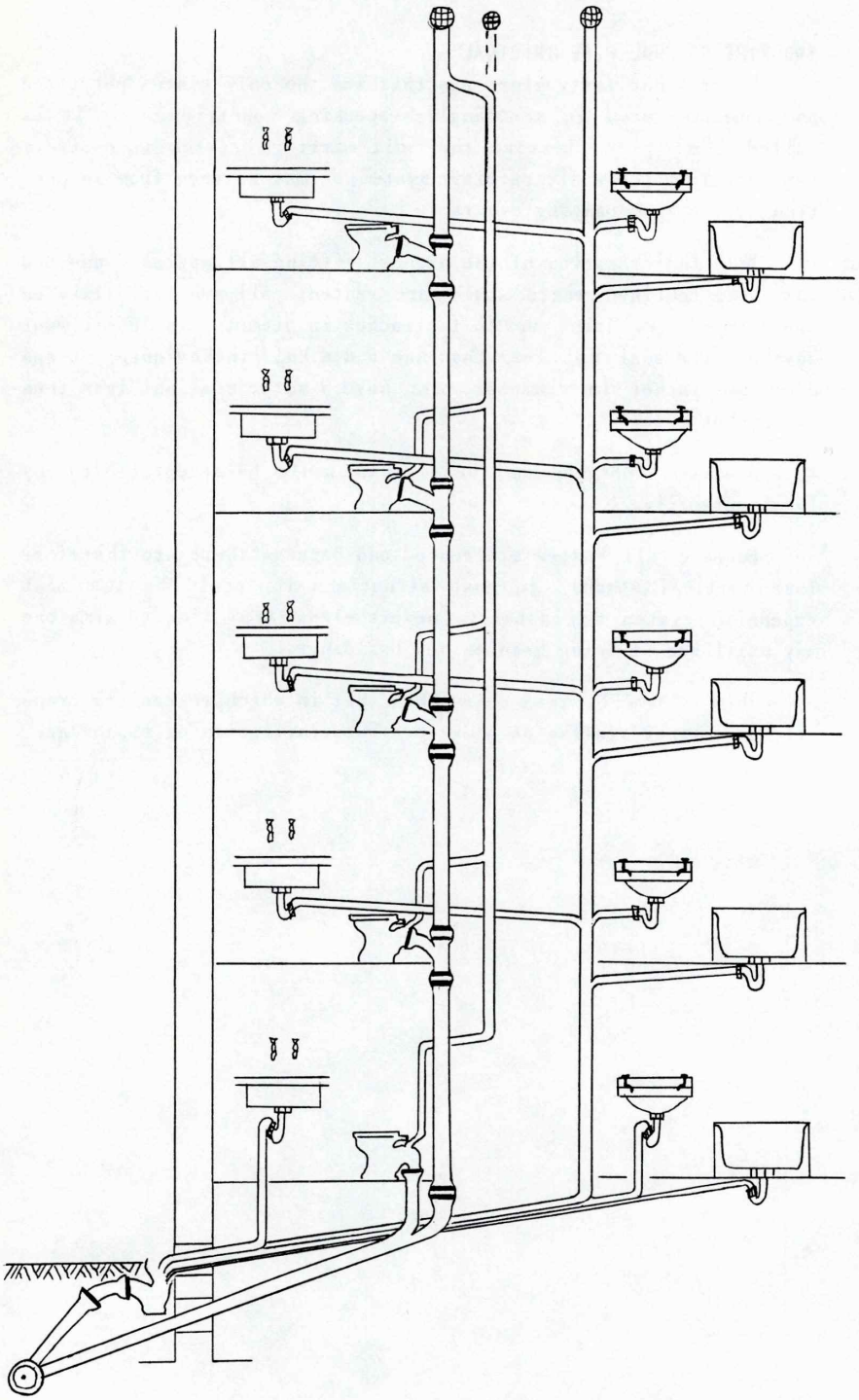
With the exception of the highest fitting all wastes connected into the combined waste stack are vented; all sanitary fixtures are trapped. Traps up to two inches in diameter inclusive must have a water seal not less than one and a half inches deep; traps over two inches in diameter must have a water seal not less than two inches deep.

A system designed on these lines would be acceptable to any local authority.

Because all wastes are vented and because there are therefore four vertical stacks, in most situations it would be the most expensive system to install; nevertheless from time to time one may still see it being used on new buildings.

This system is less noisy than that in which re-sealing traps are used, since venting as shown prevents initiation of siphonage.

TWO PIPE CURRENT PRACTICE (USING RESEALING TRAPS) -



SYSTEMS OF DOMESTIC WASTE DISPOSAL – *continued*

TWO PIPE, CURRENT PRACTICE –

This is identical with the foregoing except that vents have been omitted from all waste pipes. Instead of venting, each waste is provided with an approved resealing trap; this is permissible with the approval of the Engineer where the length of the pipe from trap to common waste does not exceed 15 feet.

If, in our diagram, the sinks are more than 15 feet distant from the combined waste, the system may be modified in one of two ways:

(a) Leave the arrangement essentially as shown, but run a vertical vent near the sinks and connect into it a branch vent from each sink. (Resealing traps are not required when anti-siphon vents are provided.)

(b) Run a separate vertical waste close to the sinks to discharge over the gully trap; connect the sink wastes into the new waste stack, using a resealing trap to each branch.

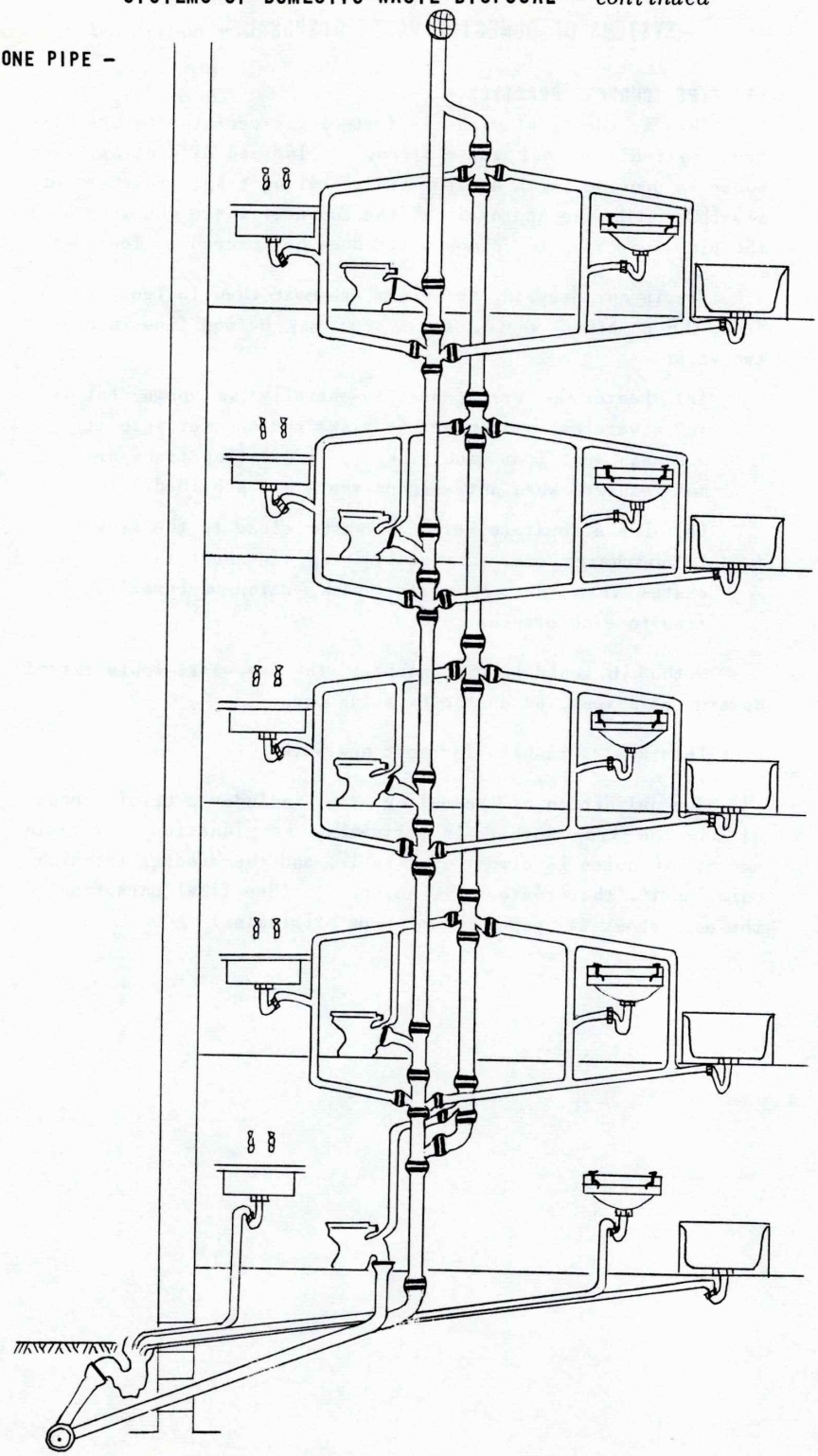
Method (b) would be the cheaper; the new waste would extend upwards as a vent, as do the existing ones.

This system is used for most new work.

The definition of 'resealing trap' includes a brief account of how the trap works; in performing its function a certain amount of noise is almost inevitable, and the greater the siphonic 'pull', the greater the noise. (See final paragraph on the page about two pipe or dual pipe originals.)

SYSTEMS OF DOMESTIC WASTE DISPOSAL – *continued*

ONE PIPE –



SYSTEMS OF DOMESTIC WASTE DISPOSAL - *continued*

ONE PIPE -

The system is called 'one pipe' because all sanitary fixtures - W.C.'s, baths, sinks, basins, etc., discharge into the same vertical soil pipe. Nevertheless it is a misnomer to the extent that every one pipe system must have two vertical pipes - namely the soil stack and the vent stack, and it is the rule that these two pipes shall be of the same diameter.

One pipe was introduced to New Zealand about 35 years ago, and for many years was regarded as an innovation of questionable efficacy and value. It is now generally accepted as one of the most useful systems, capable of effecting considerable economics if used widely. It is most useful for a multi-storey office building in which toilet and ablution facilities occupy identical positions on each floor, and is much more flexible than the single stack system described later. On the other hand, if toilet and ablution fixtures are widely separated laterally the one pipe system could prove costly.

The essentials are as follows:-

(a) The trap of every sanitary fixture shall have a water seal not less than three inches deep (deep seal).

(b) Every waste shall be provided with an anti-siphon vent pipe, vented directly or indirectly to the open air.

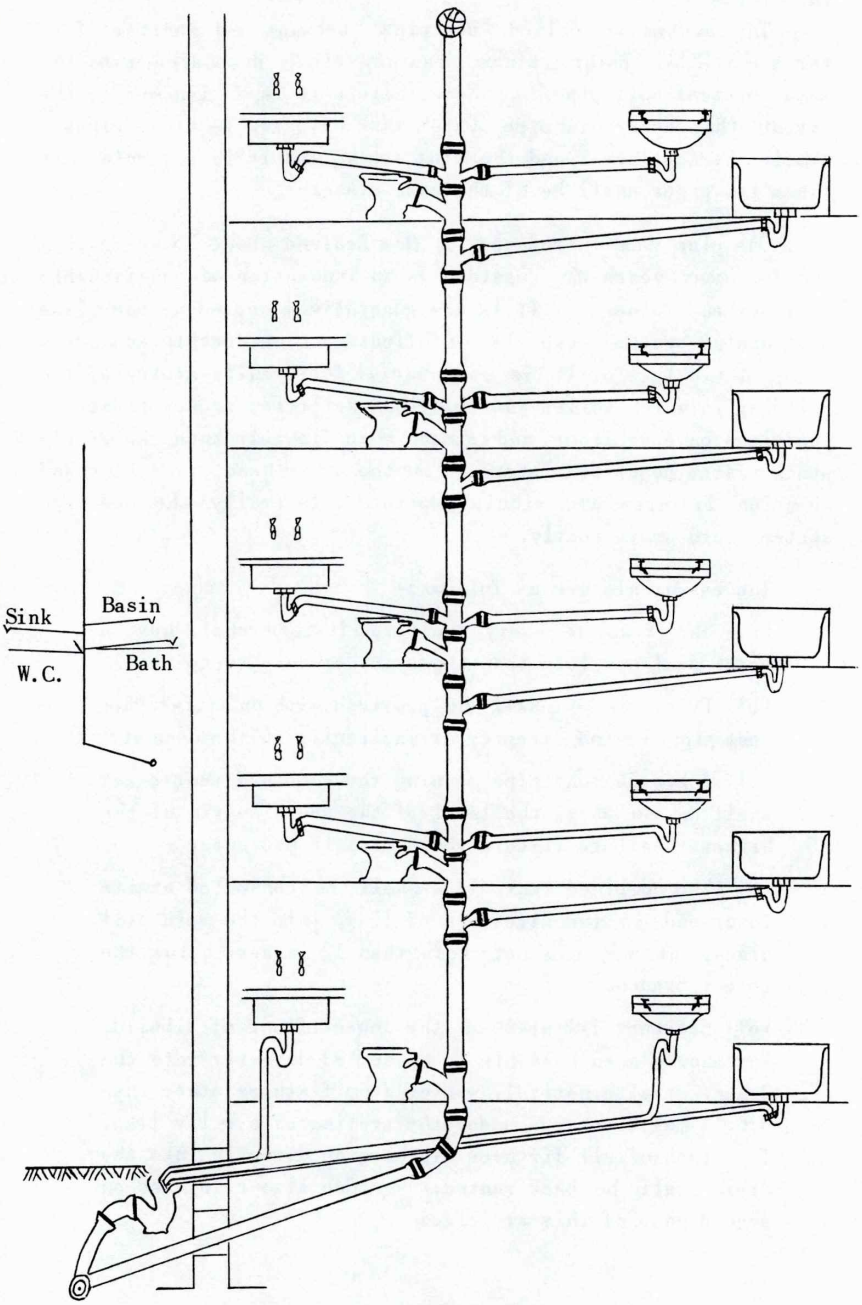
(c) A branch vent pipe joining the combined vent stack shall do so above the level of the overflow rim of the highest sanitary fixture whose trap it protects.

(d) The combined vent stack shall be connected at its lower end in the direction of flow, into the main soil stack, at a point not less than 12 inches below the lowest branch.

(e) Sanitary fixtures on the lowest floor of a building should when possible be connected directly into the drain, or alternatively wastes from fixtures other than W.C.'s may discharge under the grating of a gully trap. The traps of all fixtures discharging directly into the drain shall be back vented. (See also reference on second page of this article.)

SYSTEMS OF DOMESTIC WASTE DISPOSAL – *continued*

SINGLE STACK –



SYSTEMS OF DOMESTIC WASTE DISPOSAL – *continued*

SINGLE STACK –

This system is practically true to label in that at least up to a height of five stories it requires only one vertical stack. Although a system somewhat similar to this has been in use on the European continent for many years, it was not more than about 20 years ago that the British Building Research Station at Watford began to investigate it systematically and scientifically and shortly thereafter published the results of its initial research. It is pertinent to remark here that immediately following publication of these first results, with the cooperation of the local authorities the Housing Division of the Ministry of Works used the single stack method on approximately fifty two storey flats in the Petone – Lower Hutt district; this experiment, now 20 years old, has proved the worth of this economical system.

In spite (or perhaps because) of its simplicity however, satisfactory performance depends upon strict compliance with the rules drawn up by the Research Station for this type of installation, in which precise limits of gradient and length of waste are far more critical than in the foregoing systems.

The single stack system finds its most useful application in blocks of flats two or more storeys in height, in which all sanitary fixtures are closely grouped round or adjacent to the soil stack.

The following is a brief summary of the rules laid down by the Building Research Station for single stack installations:

(a) All traps must be deep seal.

(b) Waste pipes from individual sanitary fixtures join the soil stack separately, i.e. no common wastes.

(c) Soil stack to be not less than four inches in diameter.

(d) No offset in 'wet' part of soil stack.

(e) Provide long radius bend at foot of soil stack.

(f) Vertical distance between lowest branch on stack and invert of drain to be not less than three feet.

(g) W.C. branches, at the point of entry into the soil stack, should be curved in the direction of flow.

(h) All other waste pipes should enter the soil pipe without curvature.

SYSTEMS OF DOMESTIC WASTE DISPOSAL – *continued*

(i) The maximum length of one and a quarter inch horizontal waste from a lavatory basin with a 'P' trap is five feet six inches.

(j) The maximum length of one and a quarter inch diameter horizontal waste from a lavatory basin with an 'S' trap is 36 inches. (The horizontal length may be increased to five feet six inches if the diameter is increased to two inches.)

(k) The length of horizontal waste from a sink with a one and a half inch 'P' trap should not exceed six feet six inches.

(l) The length of horizontal waste from a bath with a one and a half inch 'P' trap should not exceed six feet six inches but extension to eight feet is permissible with a two inch trap and waste.

(m) Gradients for the above wastes must be between the upper and lower limits of five and one and a quarter degrees respectively.

(n) The bath waste may join the stack above or immediately opposite the W.C. connection, but if it joins below the connection the vertical distance between the two shall be not less than eight inches centre to centre.

The foregoing cannot be regarded as an exhaustive treatise on single stack installation, but will give some idea of its advantages and limitations.

The question of providing for the single stack system was considered when the Drainage and Plumbing Regulations were drafted in 1959, but at that time the Building Research Station had expressed some reservations and were continuing research. It was decided therefore to withhold acceptance of the system in the meantime.

The position is different now, and a firmer approach can be made. In the circumstances it is likely that the single stack system (with requirements for design details) will be included when the Regulations are revised, but until then its use will be restricted to installations which may be termed experimental.

Meanwhile research continues at the station, and single stack designs for flats exceeding 20 storeys high are now available, but this will be the subject of a future Bulletin.

SYSTEMS OF DOMESTIC WASTE DISPOSAL – *continued*

For further reading on single stacks see:

British Building Research Digests Nos. 48, 49, 96, 119, 127, 1st Series.

British Building Research Digests No. 32, 2nd Series.

Drainage Work in Dwellings (Hydraulic Design and Performance) by A.F.E. Wise, H.M. Stationery Office, London, 1957.

Service Cores in High Flats, Sanitary Plumbing.

Design Bulletin 3, Part 1, H.M. Stationery Office, London, 1962.

Note – For the sake of clarity in emphasising the characteristics of this system, the ground floor W.C. is shown connected into the soil stack, instead of being taken out independently to the drain. When this latter course is followed, it is necessary to provide the pan with a two inch diameter anti-siphonage vent.

This article was prepared by the Building Services Section of the Mechanical and Electrical Engineering Division, Ministry of Works, with the cooperation of the Department of Health.

SYSTEMS OF DOMESTIC WASTE DISPOSAL - *continued*

FEATURES COMMON TO ALL SYSTEMS -

The portion of a soil or waste pipe most susceptible to blockage is the bend at the base of the stack. It is desirable therefore that wastes and soil pipes from ground floor appliances should not be connected to soil or waste stacks; note in diagrams that ground floor W.C.'s connect separately into the drain, and wastes from other ground floor fittings discharge over a gully trap. However, these wastes may be connected into the drain in lieu of discharging over a gully trap, but in that case each waste must be vented. Note that all anti-siphonage or back vents from individual branch wastes or branch soil pipes join the combined vent pipe at a point above the overflow levels of the fittings.

Note also that at roof level, vents, soil pipes, and wastes may be extended upwards separately into the open air, vents may connect into wastes or soil pipes, or wastes and soil pipes may connect into vents. Permission is sometimes given for soil vents and waste vents to combine at some point at or just below roof level.

It is not advisable to connect floor drains into soil or waste stacks; a separate system should be used discharging over the side inlet to a gully trap.

All systems may be designed as shown up to five storeys; in buildings of over five storeys modifications will be required for the single stack system. In buildings over ten storeys modifications may be required for two pipe and one pipe systems.

WEIGHTS OF CAST IRON PIPES:

POUNDS PER LINEAR FOOT:

Interior Diameter (Inches)	*Thickness of Metal (Inches)*								
	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	*1*	$1\frac{1}{8}$	$1\frac{1}{4}$
1	3.06	5.06	–	–	–	–	–	–	–
$1\frac{1}{4}$	3.68	5.98	–	–	–	–	–	–	–
$1\frac{1}{2}$	4.29	6.90	9.82	–	–	–	–	–	–
$1\frac{3}{4}$	4.91	7.83	11.05	–	–	–	–	–	–
2	5.53	8.75	12.27	16.11	–	–	–	–	–
$2\frac{1}{4}$	6.14	9.66	13.05	17.64	–	–	–	–	–
$2\frac{1}{2}$	6.74	10.58	14.72	19.17	–	–	–	–	–
$2\frac{3}{4}$	7.36	11.50	15.95	20.70	–	–	–	–	–
3	7.98	12.43	17.18	22.19	27.62	–	–	–	–
$3\frac{1}{4}$	8.59	13.34	18.35	23.78	29.45	–	–	–	–
$3\frac{1}{2}$	9.20	14.21	19.64	25.31	31.03	37.58	–	–	–
$3\frac{3}{4}$	9.76	15.19	20.86	26.85	33.13	39.73	–	–	–
4	10.44	16.11	22.10	28.38	34.98	41.88	49.09	–	–
$4\frac{1}{4}$	11.10	17.07	23.37	29.97	36.87	44.08	51.60	–	–
$4\frac{1}{2}$	11.66	17.94	24.54	31.44	38.65	46.17	53.99	62.12	–
$4\frac{3}{4}$	12.27	18.89	25.77	32.98	40.50	48.32	56.45	64.89	–
5	12.88	19.78	26.99	34.51	42.33	50.46	58.90	67.64	76.69
$5\frac{1}{4}$	13.50	20.71	28.23	36.05	44.18	52.62	61.36	70.41	79.77

WEIGHTS OF CAST IRON PIPES – *continued*

POUNDS PER LINEAR FOOT:

Interior Diameter (Inches)	*Thickness of Metal (Inches)*								
	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
5 1/2	14.11	21.63	29.45	37.58	46.02	54.76	63.81	73.17	82.84
5 3/4	14.73	22.55	30.68	39.12	47.86	56.91	66.27	75.94	85.91
6	15.34	23.47	31.91	40.65	49.70	59.06	68.73	78.70	88.75
6 1/4	15.95	24.39	33.13	42.18	51.54	61.21	71.18	81.23	92.04
6 1/2	16.57	25.31	34.36	43.72	53.39	63.36	73.41	84.22	95.10
6 3/4	17.18	26.23	35.59	45.26	55.23	65.28	76.09	86.97	98.18
7	17.79	27.15	36.82	46.79	56.84	67.65	78.53	89.74	101.24
7 1/4	18.41	28.08	38.05	48.10	58.91	69.79	81.00	92.50	104.31
7 1/2	19.03	29.00	39.05	49.86	60.74	71.95	83.45	95.26	107.38
7 3/4	19.64	29.69	40.50	51.38	62.59	74.09	85.90	98.02	110.45
8	20.02	30.83	41.71	52.92	64.42	76.23	88.35	100.78	113.51
8 1/4	20.86	31.74	42.95	54.45	66.26	78.38	90.81	103.54	116.58
8 1/2	21.69	32.90	44.40	56.21	68.33	80.76	93.49	106.53	119.87
8 3/4	22.09	33.59	45.40	57.52	69.95	82.68	95.72	109.06	122.72
9	22.71	34.52	46.64	59.07	71.80	84.84	98.18	111.84	125.80
9 1/4	–	35.43	47.86	60.59	73.63	86.97	100.63	114.59	128.85
9 1/2	–	36.36	49.09	62.13	75.47	89.13	103.09	117.35	131.93

WEIGHTS OF CAST IRON PIPES – *continued*

POUNDS PER LINEAR FOOT:

Interior Diameter (Inches)	*Thickness of Metal (Inches)*								
	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4
9 3/4	–	37.28	50.32	63.66	77.32	91.28	105.54	120.12	134.99
10	–	38.20	51.54	65.20	79.16	93.42	108.00	122.87	138.06
10 1/4	–	–	52.77	66.73	80.99	95.57	110.44	125.63	141.12
10 1/2	–	–	54.00	68.26	82.84	97.71	112.90	128.39	144.19
10 3/4	–	–	55.22	69.80	84.67	99.86	115.35	131.15	147.26
11	–	–	56.46	71.33	86.52	102.01	117.81	133.92	150.33
11 1/4	–	–	–	72.86	88.35	104.15	120.26	136.67	153.40
11 1/2	–	–	–	74.39	90.19	106.30	122.71	139.44	156.44
11 3/4	–	–	–	75.93	92.04	108.45	125.18	142.18	159.54
12	–	–	–	77.46	93.60	110.60	127.60	144.96	162.60

WEIGHTS OF STEEL TUBES:

Approximate Outside Diameter (Inches)	*S.W.G. or (Inches)*	*Weight Per Foot (Pounds)*
$\frac{13}{32}$	15	0.244
	14	0.273
	12	0.328
$\frac{17}{32}$	15	0.348
	14	0.391
	12	0.482
$\frac{11}{16}$	15	0.455
	13	0.573
	11	0.693
$\frac{27}{32}$	14	0.643
	12	0.825
	10	0.982
$1\frac{1}{16}$	13	0.941
	11	1.173
	9	1.413
$1\frac{11}{32}$	12	1.349
	10	1.651
	8	2.009
	6	2.362
$1\frac{11}{16}$	12	1.729
	9	2.357
	7	2.821
	5	3.341
$1\frac{29}{32}$	11	2.201
	8	2.988
	6	3.520
	4	4.149
$2\frac{3}{8}$	11	2.779
	8	3.795
	$6\frac{1}{4}$	4.488
		5.674
3	10	3.893
	7	5.301
	$5\frac{1}{4}$	6.304
		7.343
$3\frac{1}{2}$	10	4.577
	7	6.246
	$5\frac{1}{4}$	7.442
		8.679
4	9	5.878
	7	7.172
	$5\frac{1}{4}$	8.557
		10.014
$4\frac{1}{2}$	9	6.647
	7	8.117
	$5\frac{1}{4}$	9.695
		11.349

WEIGHTS OF STEEL TUBES – *continued*

Approximate Outside Diameter (Inches)	*S.W.G. or (Inches)*	*Weight Per Foot (Pounds)*
5½	7	10.006
	5¼	11.971
	9/32	14.019
		15.678
6½	7	11.891
	5¼	14.241
	9/32	16.690
		18.682
6⅝	7	12.124
	5¼	14.522
	9/32	17.024
		19.058
7⅝	6	15.244
	5¼	16.786
	9/32	19.694
		22.062
8⅝	6	17.295
	5¼	19.051
	9/32	22.364
		25.066
9⅝	6	19.346
	4 9/32	23.277
	3/8	28.070
		37.051
10¾	6	21.653
	¼	28.039
	9/32	31.450
	3/8	41.557
11¾	6	23.704
	¼	30.709
	9/32	34.454
	3/8	45.563
12¾	5	28.392
	9/32	37.458
	5/16	41.516
	3/8	49.568
14	¼	36.718
	9/32	41.213
	3/8	54.575
	½	72.100
16	¼	42.059
	9/32	47.221
	3/8	62.586
	½	82.781

PAINTING AND PAPERHANGING:

PAINT COVERAGES:

COVERAGE PER GALLON:

Surface	*Coat*	*Approximate Coverage Per Gallon (Square Yards)*
Outside woodwork	Priming	95
	Second	110
	Third	130
Inside woodwork	Priming	95
	Second	110
	Finish - Flat	120
	Egg-shell	120
	Oil-gloss	130
Inside woodwork	Priming	95
Enamel finish	Second and third	110
Plaster interior	Priming	90
	Second	110
	Finish - Flat	120
	Egg-shell	120
	Oil-gloss	130
Exterior walls - Stucco or brick	Priming	90
	Second	105
	Third	130
Exterior walls - Concrete or stone	Priming	100
	Second	105
	Third	130
Ironwork - Interior or exterior	Priming	80
	Second	110
	Third	105

PAINT COVERAGES – *continued*

COVERING CAPACITIES PER 100 SQUARE YARDS:

Description of Material	*Surface*	*Coats*		*Unit*
		First	*Second*	
Creosote	Wood (rough)	5	–	gallons
Creosote	Wood (wrot)	2	–	gallons
Enamel (see information by manufacturer)				
French Polish	Wood	$\frac{3}{4}$	–	gallon
Glass paper (cleaning)	Wood (old)	24	–	sheets
Knotting	Wood	1	–	pint
Oil	Wood	4	–	gallons
Paints (see information by manufacturer)				
Size	Plaster	3	–	pounds
Stain	Wood	$\frac{1}{2}$	–	gallon
Tar	Wood (rough)	10	–	gallons
Tar	Wood (wrot)	5	–	gallons
Water paints and distempers	Plaster	15	$7\frac{1}{2}$	pounds
Water paints and distempers	Stucco	24	12	pounds
Water paints and distempers	Porous	14	17	pounds
Water paints and distempers	Rough-cast	74	37	pounds
Whitening	Plaster	10	7	pounds

One gallon of ready mixed paint weighs approximately 27 pounds.

PAINT COVERAGES – *continued*

BACK PRIMING AND PAINT TO EDGES OF WEATHERBOARDS:
(Taken as percentage of face area)

Weatherboard	*Sizes (Inches)*			
	6 x 1	*8 x 1*	*9 x 1*	*9 x 1¼*
BACK PRIMING –				
Bevel back	59	40	35	35
Ship lap	61	42	37	40
Rebated bevel back	56	39	34	37
PAINT TO EDGES –				
Bevel back	20	14	12	16
Ship lap	–	–	–	–
Rebated bevel back	14	10	9	10

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS:

BULB FLATS:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
56	6.46	1' 0"
	7.31	1' 0"
	9.86	1' 1"
6	7.42	1' 2"
	8.44	1' 2"
	11.50	1' 3"
7	10.19	1' 4"
	11.38	1' 4"
	14.95	1' 4"
8	12.59	1' 7"
	13.95	1' 7"
	18.03	1' 7"
9	15.48	1' 9"
	17.01	1' 9"
	21.60	1'10"
10	18.39	2' 0"
	20.09	2' 0"
	25.19	2' 0"
11	21.85	2' 2"
	23.72	2' 2"
	29.33	2' 2"
12	25.22	2' 4"
	27.26	2' 4"
	33.38	2' 5"
13½	31.19	2' 8"
	33.49	2' 8"
	40.37	2' 8"
15	37.82	2'11"
	40.37	2'11"
	48.02	3' 0"
17	47.38	3' 4"
	50.27	3' 4"
	58.94	3' 4"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

BULB ANGLES:

Serial Size (Inches)	*Area (Per Foot)*
4 x $2\frac{1}{2}$	1' 2"
5 x $2\frac{1}{2}$	1' 4"
5 x 3	1' 5"
$5\frac{1}{2}$ x 3	1' 7"
6 x 3	1' 8"
6 x $3\frac{1}{2}$	1' 9"
7 x 3	1'10"
7 x $3\frac{1}{2}$	1'11"
8 x 3	2' 0"
8 x $3\frac{1}{2}$	2' 1"
9 x $3\frac{1}{2}$	2' 3"
10 x $3\frac{1}{2}$	2' 6"
11 x $3\frac{1}{2}$	2' 8"
12 x $3\frac{1}{2}$	2'10"
$13\frac{1}{2}$ x 4	3' 3"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

EQUAL ANGLES:

Serial Size (Inches)	*Area (Per Foot)*
1 x 1	4"
$1\frac{1}{4}$ x $1\frac{1}{4}$	5"
$1\frac{1}{2}$ x $1\frac{1}{2}$	6"
$1\frac{3}{4}$ x $1\frac{3}{4}$	7"
2 x 2	8"
$2\frac{1}{4}$ x $2\frac{1}{4}$	9"
$2\frac{1}{2}$ x $2\frac{1}{2}$	10"
3 x 3	1' 0"
$3\frac{1}{2}$ x $3\frac{1}{2}$	1' 2"
4 x 4	1' 4"
5 x 5	1' 8"
6 x 6	2' 0"
8 x 8	2' 8"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

UNEQUAL ANGLES:

Serial Size (Inches)	*Area (Per Foot)*
2 x 1½	7"
2½ x 1½	8"
2½ x 2	9"
3 x 2	10"
3 x 2½	11"
3½ x 2½	1' 0"
3½ x 3	1' 1"
4 x 2½	1' 1"
4 x 3	1' 2"
4 x 3½	1' 3"
5 x 3	1' 4"
5 x 3½	1' 5"
6 x 3	1' 6"
6 x 3½	1' 7"
6 x 4	1' 8"
7 x 3½	1' 9"
8 x 4	2' 0"
8 x 6	2' 4"
9 x 9	2' 2"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

ROLLED LONG STALK T-BARS:

Serial Size (Inches)	*Area (Per Foot)*
1 x 3	8''
$1\frac{1}{3}$ x $4\frac{1}{2}$	1' 1''
$2\frac{1}{2}$ x 5	1' 3''
3 x 6	1' 6''
$3\frac{1}{2}$ x 7	1' 9''
4 x 8	2' 0''
5 x 10	2' 6''

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS - *continued*

T-BARS:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
6 x 3	7.85	1' 6"
	10	1' 6"
	12.5	1' 7"
8 x 4	15.5	2' 0"
	17.5	2' 0"
	20	2' 0"
	24	2' 1"
	29	2' 1"
10 x 5	24.5	2' 6"
	30	2' 6"
	36	2' 7"
	44.5	2' 7"
12 x 6	32.5	3' 0"
	39.5	3' 1"
	46	3' 1"
	53	3' 1"
$14\frac{1}{2}$ x 7	43	3' 7"
	51	3' 7"
	59	3' 8"
	68	3' 8"
16 x 7	79	3'10"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

ROLLED SHORT STALK T-BARS:

Serial Size (Inches)	*Area (Per Foot)*
$1\frac{1}{2}$ x $1\frac{1}{2}$	6"
2 x 2	8"
$2\frac{1}{2}$ x $2\frac{1}{2}$	10"
3 x 3	1' 0"
4 x 3	1' 2"
4 x 4	1' 4"
5 x 3	1' 4"
5 x 4	1' 6"
6 x 3	1' 6"
6 x 4	1' 8"
6 x 6	2' 0"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

T-BARS:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
$5\frac{1}{4}$ x 4	8.5	1' 7"
	10.0	1' 7"
$5\frac{3}{4}$ x 5	10.5	1' 9"
	12.5	1'10"
	14.5	1'10"
5 x 6	12.0	1'10"
	14.0	1'10"
	16.0	1'10"
$6\frac{1}{2}$ x 6	13.5	2' 1"
	15.5	2' 1"
	18.0	2' 1"
$6\frac{3}{4}$ x 7	15.0	2' 3"
	17.0	2' 4"
	19.0	2' 4"
	22.5	2' 4"
6 x $7\frac{1}{2}$	17.5	2' 2"
	20.0	2' 3"
	22.5	2' 4"
6 x 8	20.0	2' 4"
	22.5	2' 4"
	25.0	2' 5"
7 x 8	18.0	2' 6"
	20.0	2' 6"
	22.5	2' 6"
	25.0	2' 6"
6 x 9	22.5	2' 6"
	25.0	2' 6"
	27.5	2' 6"
$7\frac{1}{2}$ x 9	25.0	2' 9"
	27.5	2' 9"
	30.0	2' 9"
	33.0	2'10"
$8\frac{1}{4}$ x $10\frac{1}{2}$	31.0	3' 2"
	34.0	3' 2"
	36.5	3' 2"
	41.0	3' 2"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

T-BARS – *continued*

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
13 x $10\frac{1}{2}$	56.0	3'11"
	63.5	3'11"
	71.0	4' 0"
9 x 12	38.0	3' 6"
	42.0	3' 6"
	47.0	3' 6"
12 x 12	50.0	4' 0"
	60.0	4' 1"
	80.0	4' 2"
10 x $13\frac{1}{2}$	47.0	3'11"
	51.0	4' 0"
	57.0	4' 0"
$10\frac{1}{2}$ x 15	58.0	4' 3"
	66.0	4' 3"
$11\frac{1}{2}$ x $16\frac{1}{2}$	65.0	4' 8"
	76.0	4' 9"
12 x 18	75.0	5' 0"
	85.0	5' 0"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

CHANNELS:

Serial Size (Inches)	*Area (Per Foot)*
3 x 1½	1' 0"
4 x 2	1' 4"
5 x 2½	1' 8"
6 x 3	2' 0"
6 x 3½	2' 2"
7 x 3	2' 2"
7 x 3½	2' 4"
8 x 3	2' 4"
8 x 3½	2' 6"
9 x 3	2' 6"
9 x 3½	2' 8"
10 x 3	2' 8"
10 x 3½	2' 10"
12 x 3½	3' 2"
12 x 4	3' 4"
15 x 4	3' 10"
17 x 4	4' 2"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

UNIVERSAL BEARING PILES:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
8 x 8	36	4' 0"
10 x 10	42	4'11"
	57	5' 0"
12 x 12	53	5'11"
	74	6' 0"
14 x 14½	73	7' 1"
	89	7' 1"
	102	7' 2"
	117	7' 2"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

JOISTS WITH TAPERED FLANGES:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
3 x 2	4.50	1' 2"
4 x 2½	6.50	1' 6"
5 x 3	9	1'10"
6 x 3½	11.50	2' 2"
7 x 4	14.50	2' 6"
8 x 4	17	2' 8"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

UNIVERSAL COLUMN SECTIONS:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
6 x 6	15.7	3' 0"
	20	3' 0"
	25	3' 0"
8 x 8	31	4' 0"
	35	4' 0"
	40	4' 0"
	48	4' 1"
	58	4' 1"
10 x 10	49	4'11"
	60	5' 0"
	72	5' 1"
	89	5' 1"
	112	5' 3"
12 x 12	65	6' 0"
	79	6' 0"
	92	6' 1"
	106	6' 1"
	133	6' 2"
	161	6' 4"
	190	7' 3"
14 x 14½	87	7' 1"
	103	7' 2"
	119	7' 2"
	136	7' 3"
Column core	320	8' 0"
14 x 16	158	7' 6"
	193	7' 8"
	228	7' 9"
	264	7'11"
	314	8' 0"
	370	8' 2"
	426	8' 4"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

ROLLED STEEL JOISTS:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
8 x 5¼	17	3' 1"
	20	3' 1"
10 x 5¾	21	3' 6"
	25	3' 7"
	29	3' 7"
12 x 5	25	3' 7"
	28	3' 7"
	32	3' 7"
12 x 6½	27	4' 1"
	31	4' 2"
	36	4' 2"
14 x 6¾	30	4' 6"
	34	4' 6"
	38	4' 7"
	45	4' 7"
15 x 6	35	4' 5"
	40	4' 6"
	45	4' 6"
16 x 6	40	4' 7"
	45	4' 8"
	50	4' 8"
16 x 7	36	4'11"
	40	4'11"
	45	5' 0"
	50	5' 0"
18 x 6	45	4'11"
	50	5' 0"
	55	5' 0"
18 x 7½	50	5' 5"
	55	5' 6"
	60	5' 6"
	66	5' 6"
21 x 8¼	62	6' 2"
	68	6' 3"
	73	6' 3"
	82	6' 3"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

ROLLED STEEL JOISTS – *continued*

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Area (Per Foot)*
21 x 13	112	7' 9"
	127	7'10"
	142	7'10"
24 x 9	76	6'11"
	84	6'11"
	94	7' 0"
24 x 12	100	7'11"
	120	8' 0"
	160	8' 1"
27 x 10	94	7' 9"
	102	7' 9"
	114	7'10"
30 x 10½	116	8' 5"
	132	8' 6"
33 x 11½	130	9' 3"
	152	9' 4"
36 x 12	150	9'10"
	170	9'11"
	194	10' 0"
36 x 16½	230	11' 4"
	260	11' 5"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

RECTANGULAR HOLLOW SECTIONS:

Serial Size (Inches)	*Area (Per Foot)*
2 x 1	6"
2 x 1½	7"
3 x 1½	9"
3 x 2	10"
3½ x 1½	10"
4 x 2	1' 0"
4 x 3	1' 2"
5 x 2	1' 2"
5 x 2½	1' 3"
5 x 3	1' 4"
6 x 3	1' 6"
6 x 4	1' 8"
8 x 4	2' 0"
8 x 6	2' 4"
10 x 6	2' 8"
12 x 8	3' 4"

PAINTING AREAS OF STRUCTURAL STEEL MEMBERS – *continued*

SQUARE HOLLOW SECTIONS:

Serial Size (Inches)	*Area (Per Foot)*
1 x 1	4"
$1\frac{1}{2}$ x $1\frac{1}{2}$	6"
2 x 2	8"
$2\frac{1}{2}$ x $2\frac{1}{2}$	10"
3 x 3	1' 0"
$3\frac{1}{2}$ x $3\frac{1}{2}$	1' 2"
4 x 4	1' 4"
$4\frac{1}{2}$ x $4\frac{1}{2}$	1' 6"
5 x 5	1' 8"
6 x 6	2' 0"
7 x 7	2' 4"
8 x 8	2' 8"
10 x 10	3' 4"

PAPERHANGING:

12 yards lineal = 1 piece of paper = 1 English roll = 7 square yards.
1 dozen border = 12 yards.

Paper is usually 21 inches wide.

To find the number of English rolls of paper required to cover a room, divide the superficial area to be covered in feet by 60 for plain lining papers, and by 54 for patterned papers to allow for waste.

Waste is sometimes allowed for as one English roll in seven.

English wallpapers are 21 inches wide and 12 yards long.

Lining papers are 22½ inches wide by the same length.

French wallpapers are 18 inches wide and 9 yards long.

New Zealand wallpapers are 21 inches wide and 11 yards long.

PAPERHANGING – *continued*

NUMBER OF ENGLISH ROLLS OF WALLPAPER REQUIRED:

Length Around the Walls (Feet)	*Height from Skirting to Cornice (Feet)*									
	6	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*16*
32	4	4	5	5	6	6	7	7	8	8
36	4	5	5	6	6	7	7	8	9	9
40	4	5	6	6	7	8	8	9	9	10
44	5	5	6	7	8	8	9	10	10	11
48	5	6	7	7	8	9	10	10	11	12
52	6	6	7	8	9	10	10	11	12	13
56	6	7	8	8	9	10	11	12	13	14
60	6	7	8	9	10	11	12	13	14	15
64	7	8	9	10	11	12	13	14	15	16
68	7	8	9	10	11	12	13	15	16	17
72	7	9	10	11	12	13	14	15	17	18
76	8	9	10	11	13	14	15	16	17	19
80	8	9	11	11	13	15	16	17	18	20
84	9	10	11	12	14	15	17	18	19	21
88	9	10	12	12	14	16	17	19	20	22
92	9	11	12	13	15	17	18	19	21	22
96	10	11	13	13	16	17	19	20	22	23
100	10	12	13	15	16	18	20	21	24	26

SCHEDULE OF PAINT FINISHES:

Scheduling Term	*Also Known As, or Similar To*	*Timber*	*Hardboard*	*Softboard*	*Asbestos*	*Plaster Coreboard*	*Fibrous Plaster*	*Concrete*	*Plaster*	*Brickwork*	*Concrete Block*	*Cast Iron*	*Copper*	*Galvanised Iron*	*Aluminium*	*Mild Steel*
EXTERIOR PAINTS –																
Exterior paint	Oil gloss, ordinary paint, lead, lead zinc, P.T.A.I. or N.Z.S.S. 521	abc	gbc	–	–	–	–	–	–	–	–	dbc	dbc	dbc	dbc	dbc
Exterior high gloss paint	High gloss, synthetic enamel, exterior gloss enamel	abc	gbc	–	–	–	–	–	–	–	–	dbc	dbc	dbc	dbc	dbc
Exterior varnish	Marine varnish, spar varnish	4 coats	(Not very much used as outside varnish – not successful)													
P.V.A. emulsion	Resene, tinex, plastic paint	–	g2c	–	2c	–	g2c	2c	2c	2c	2c	–	–	–	–	–
Alkyd emulsion	Prep, muraltone, etc.	–	–	–	2c	–	–	2c	2c	–	2c	–	–	–	–	–
Cement paints	Stipplecote, boncote, etc.	–	–	–	2c	–	–	2c	2c	2c	2c	–	–	–	–	–
Roof paints	–	–	–	–	–	–	–	–	–	–	–	2c	dc	c	dc	dc
Chlorinated rubber paints	Altex, colonex	(Used primarily in swimming baths – battery rooms, and generally where emulsion paints are used – 2 coats.)														
Waterproof compound	Clear waterproofing, cemfortis, silicone resins	–	–	–	c	–	–	c	c	c	c	–	–	–	–	–
Raw oil	Raw linseed oil	c	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Refined oil	–	c	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Double boiled oil	Boiled linseed oil	c	–	–	–	–	–	–	–	c	–	–	–	–	–	–
Pale boiled oil	–	c	–	–	–	–	–	–	–	c	–	–	–	–	–	–

SCHEDULE OF PAINT FINISHES – *continued*

Scheduling Term	*Also Known As, or Similar To*	*Timber*	*Hardboard*	*Softboard*	*Asbestos*	*Plaster Coreboard*	*Fibrous Plaster*	*Concrete*	*Plaster*	*Brickwork*	*Concrete Block*	*Cast Iron*	*Copper*	*Galvanised Iron*	*Aluminium*	*Mild Steel*
INTERIOR PAINTS –																
Full gloss enamel	High gloss, glossy, plastic gloss	a2bc	g2bc	g2bc	–	fg2bc	fg2bc	g2bc	g2bc	–	–	d2bc	d2bc	d2bc	d2bc	d2bc
Semi gloss enamel	Semi flat, semi matt, plastic synthetic, or flat, etc.	a2bc	g2bc	g2bc	–	fg2bc	fg2bc	g2bc	g2bc	–	–	d2bc	d2bc	d2bc	d2bc	d2bc
Flat enamel	Matt, matt enamel, monocoat, etc.	a2bc	g2bc	g2bc	–	fg2bc	fg2bc	g2bc	g2bc	–	–	d2bc	d2bc	d2bc	d2bc	d2bc
Full gloss varnish	Gloss, full gloss, glossy	3 or 4c	3 or 4c	(Filler where required.)												
50/50 varnish	Semi gloss varnish	3 or 4c	3 or 4c	–	–	–	–	–	–	–	–	–	–	–	–	–
Eggshell gloss varnish	Eggshell, eggshell flat, eggshell gloss	3 or 4c	3 or 4c	–	–	–	–	–	–	–	–	–	–	–	–	–
Spirit varnish	Knotting	3 or 4c	(Generally used as a sealer.)													
Floor varnish	Hard varnish	3c	–	–	–	–	–	–	–	–	–	–	–	–	–	–
P.V.A. emulsion	Resene, tinex, etc.	–	g2c	g2c	2c	f2c	f2c	2c	2c	2c	2c	–	–	–	–	–
Alkyd emulsion	Prep, muraltone, etc.	–	g2c	g2c	2c	f2c	f2c	2c	2c	2c	2c	–	–	–	–	–
Refined oil	Raw linseed oil	c	c	–	–	–	–	–	–	–	–	–	–	–	–	–
Epikote varnish	Clear hard finish	2c	2c	–	–	–	–	–	–	–	–	–	–	–	–	–
Phenol formaldehyde varnish	Pheenopol, pheenoglaze	2c	2c	–	–	–	–	–	–	–	–	–	–	–	–	–
French polish	–	(Filler where required – specialised finish.)														
Epikote paint	–	2c	2c	–	–	–	–	a2c	d2c	–	–	–	–	–	–	–

Notes: The term 'synthetic' has been purposely omitted as almost all paints are made of synthetic resins, and not natural resins. The term 'plastic' appears to be a name used for flat or emulsion paints, and is indefinable.

a – primer. b – normal undercoat. c – finishing coat. d – special primer for the material concerned.

f – lining paper. g – sealer.

QUANTITY SURVEYING:

NEW ZEALAND CERTIFICATE IN QUANTITY SURVEYING:

This part time course is for students wishing to become quantity surveyors. The subjects and syllabuses for this course are set out below.

From 1969 this certificate will be a prerequisite qualification for membership of the Quantity Surveyors Institute of New Zealand. Certificate holders applying for membership will be required to satisfy the Institute's requirements and pass an examination set by them.

First Year -

Maths I
Physics I
Building Drawing
Construction I

Second Year -

Maths II
Mechanics
English
Construction II

Third Year -

Quantity Surveying I
Construction III
Building Science I

Fourth Year -

Quantity Surveying II
Professional Practice and Building Law
Construction IV
Building Science II

Fifth Year -

Quantity Surveying III
Pricing and Estimating
Construction V

A summary is given below of the syllabus for the specialist subjects for the New Zealand certificate course.

Construction I -

Materials and construction related to a single storey timber framed house.

Construction II -

Two storey timber construction, scaffolding, single storey reinforced concrete frame.

NEW ZEALAND CERTIFICATE IN QUANTITY SURVEYING – *continued*

Construction III –

Construction from foundations to finishing trades of a three storey reinforced concrete frame building with trussed or slab roofs.

Construction IV –

Multistorey steel framed building, wall systems (including curtain walls), fireproofing, provisions for building services long span roofs.

Construction V –

Specialised construction and services including prestressed concrete, 'glulam', prefabricated and modular construction.

Building Science I and II –

Characteristics of building materials and the effects of temperature and moisture changes and chemical action. Mechanical properties of materials and the nature and effects of loading, underlying principles of building services.

Building Drawing –

Orthographic and pictorial drawing, solid and plane geometry, drawing in plan section and elevation details relating to a timber framed building.

Quantity Surveying I –

Basic measuring techniques, use of schedules of quantities, measuring related to the work of Construction I and II.

Quantity Surveying II –

Measuring of all trades for multistorey building.

Professional Practice and Building Law –

Business organisation for the quantity surveyor, contract and arbitration law, conditions of contract.

Pricing and Estimating –

Principles of estimating, preparation and presentation of cost accounts for building contracts.

THE QUANTITY SURVEYORS' INSTITUTE OF NEW ZEALAND (INC.)
SCALE OF PROFESSIONAL CHARGES:

These are only the main scale of charges and for more detailed information see the booklet on the scale of professional charges.

Preparation of a schedule of quantities	$1\frac{1}{2}\%$
The making up of progress payments on each certificate	$\frac{1}{2}\%$
For final accounts and variations	2 %
For full professional services (this includes all the previous stated services)	$2\frac{3}{4}\%$

QUANTITY SURVEY TABLES:

CONVERSION TABLE FOR QUANTITIES:

LINEAR YARDS (L.Y.):

9" = $\frac{1}{4}$

1'6" = $\frac{1}{2}$

2'3" = $\frac{3}{4}$

SQUARE YARDS (S.Y.):

1 foot = $\frac{1}{8}$

2 feet = $\frac{1}{4}$

3 feet = $\frac{3}{8}$

4 feet = $\frac{1}{2}$

5 feet = $\frac{5}{8}$

6 feet = $\frac{5}{8}$

7 feet = $\frac{3}{4}$

8 feet = $\frac{7}{8}$

CUBIC YARDS (C.Y.):

2' - 4' = $\frac{1}{8}$

5' - 7' = $\frac{1}{4}$

8' -10' = $\frac{3}{8}$

11' -16' = $\frac{1}{2}$

17' -19' = $\frac{5}{8}$

20' -22' = $\frac{3}{4}$

23' -25' = $\frac{7}{8}$

CONVERSION TABLE FOR QUANTITIES - *continued*

HUNDRED-WEIGHT (CWT):

7 - 21	pounds	= $\frac{1}{8}$
22 - 35	pounds	= $\frac{1}{4}$
36 - 49	pounds	= $\frac{3}{8}$
50 - 63	pounds	= $\frac{1}{2}$
64 - 77	pounds	= $\frac{5}{8}$
78 - 91	pounds	= $\frac{3}{4}$
92 - 105	pounds	= $\frac{7}{8}$
106 - 112	pounds	= 1

FACTOR FOR AREA OF CORRUGATED ROOFING:

To find the actual surface areas of various corrugated roofs, multiply the flat area by:

1.16 for corrugated iron,

1.22 for super-six asbestos,

1.26 for standard asbestos.

ROUNDING-OFF CHART FOR SCHEDULED QUANTITIES:

Quantities will be scheduled to the nearest figure given below. If half or over, to figure above; if under half to figure below. If under 1 cwt or 1 cubic yard the measurement to be taken to the nearest pound or cubic foot respectively.

Trade	*Quantity*	*0 to 5*	*6 to 10*	*11 to 50*	*51 to 100*	*101 to 500*	*Above 500*
Excavation	Cubic yards	$\frac{1}{4}$	$\frac{1}{2}$	1	1	5	5
	Square yards	$\frac{1}{2}$	1	1	1	5	5
	Square feet	$\frac{1}{2}$	1	1	1	5	5
	Number	1	1	1	1	1	1
Concrete work and precast concrete. (If under 1 cubic yard it shall be given in cubic feet.)	Cubic yards	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	1	1
	Square yards	$\frac{1}{2}$	1	1	1	5	10
	Square feet	1	1	1	1	5	10
	Linear feet	1	1	1	1	5	10
	Number	1	1	1	1	1	1

ROUNDING-OFF CHART FOR SCHEDULED QUANTITIES – *continued*

Trade	*Quantity*	*0 to 5*	*6 to 10*	*11 to 50*	*51 to 100*	*101 to 500*	*Above 500*
Reinforcing and structural steel. (If under 1 cwt the weight shall be given in pounds to the nearest pound. Weights under 1 pound given within the description shall be to the nearest eighth of a pound.)	Pounds	$\frac{1}{8}$	$\frac{1}{2}$	1	1	–	–
	Hundredweight	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	1
	Number	1	1	1	1	1	1
	Square yards	$\frac{1}{4}$	$\frac{1}{2}$	1	1	5	10
	Linear feet	$\frac{1}{2}$	1	1	1	5	10
Pre-stressing and post tensioning.	Number	1	1	1	1	1	1
	Linear feet	$\frac{1}{2}$	$\frac{1}{2}$	1	1	5	5
Brickwork, masonry and concrete blockwork.	Square yards	$\frac{1}{4}$	$\frac{1}{2}$	1	1	1	1
	Linear feet	1	1	1	1	1	1
	Number	1	1	1	1	1	1
Metalwork. (If under 1 cwt the weight shall be given in pounds to the nearest pound. Weights under 1 pound given within the description shall be to the nearest eighth of a pound.)	Pounds	$\frac{1}{2}$	1	1	1	–	–
	Hundredweight	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	1
	Linear feet	$\frac{1}{2}$	1	1	1	5	10
	Square feet	$\frac{1}{2}$	1	1	1	5	10
	Number	1	1	1	1	1	1

ROUNDING-OFF CHART FOR SCHEDULED QUANTITIES – *continued*

Trade	*Quantity*	*0 to 5*	*6 to 10*	*11 to 50*	*51 to 100*	*101 to 500*	*Above 500*
Carpentry and joinery, joinery fittings. (For individual quantities within the items, board measure, square feet and linear feet up to 10 to be to the nearest half.	Board measure	1	1	1	1	5	10
	Square feet	1	1	1	1	5	10
	Linear feet	1	1	1	1	5	10
	Number	1	1	1	1	1	1
Roof coverings	Square yards	$\frac{1}{2}$	1	1	1	1	5
	Square feet	$\frac{1}{2}$	1	1	1	5	5
	Linear feet	$\frac{1}{2}$	1	1	1	5	10
	Number	1	1	1	1	1	1
Plumbing, drainage, mechanichal services and electrical work. (For individual quantities within the items square feet and linear feet up to 10 to be to the nearest half.	Square feet	1	1	1	1	5	5
	Linear feet	1	1	1	1	5	5
	Number	1	1	1	1	1	1

ROUNDING-OFF CHART FOR SCHEDULED QUANTITIES – *continued*

Trade	*Quantity*	*0 to 5*	*6 to 10*	*11 to 50*	*51 to 100*	*101 to 500*	*Above 500*
Solid plaster	Square yards	¼	1	1	1	5	5
	Linear feet	½	1	1	1	5	10
	Number	1	1	1	1	1	1
Fibrous plaster	Square yards	¼	½	1	1	5	5
	Linear feet	½	1	1	1	5	10
	Number	1	1	1	1	1	1
Ceramic tiling and terrazzo.	Square yards	⅛	¼	½	1	1	5
	Linear feet	½	1	1	1	1	5
	Number	1	1	1	1	1	1
Resilient floor coverings.	Square yards	¼	½	1	1	1	5
	Linear feet	½	1	1	1	1	5
	Number	1	1	1	1	1	1

ROUNDING-OFF CHART FOR SCHEDULED QUANTITIES – *continued*

Trade	*Quantity*	*0 to 5*	*6 to 10*	*11 to 50*	*51 to 100*	*101 to 500*	*Above 500*
Painting	Square yards	¼	½	1	1	5	5
	Linear yards	½	1	1	1	5	5
	Number	1	1	1	1	1	1
Glazing	Square feet	½	1	1	1	5	5
	Number	1	1	1	1	1	1

ROOFS:

ROOF FACTORS:

Degree	*Rafters*	*Rise*	*Hip*
5	1.0038	0.0875	1.4169
6	1.0055	0.1056	1.4181
7	1.0075	0.1228	1.4196
8	1.0098	0.1405	1.4212
9	1.0125	0.1584	1.4231
10	1.0154	0.1763	1.4252
11	1.0187	0.1944	1.4276
12	1.0223	0.2126	1.4301
13	1.0263	0.2309	1.4330
14	1.0306	0.2493	1.4360
15	1.0353	0.2679	1.439
16	1.0403	0.287	1.443
17	1.0457	0.306	1.447
18	1.052	0.325	1.451
19	1.058	0.344	1.455
20	1.064	0.364	1.460
21	1.071	0.384	1.465
22	1.078	0.404	1.471
23	1.086	0.424	1.477
24	1.095	0.445	1.483
25	1.104	0.466	1.489
26	1.113	0.488	1.496
26 $\frac{1}{2}$	1.118	0.500	1.500
27	1.122	0.509	1.503
28	1.132	0.532	1.511
29	1.143	0.554	1.519
30	1.154	0.577	1.528
31	1.166	0.601	1.537
32	1.179	0.625	1.546
33	1.192	0.649	1.556
33 $\frac{1}{3}$	1.201	0.667	1.563
34	1.206	0.674	1.567
35	1.221	0.700	1.578
36	1.236	0.726	1.590
37	1.252	0.754	1.602
38	1.269	0.781	1.615
39	1.287	0.810	1.629
40	1.305	0.839	1.644

VARIATIONS OF ROOF AREA WITH SLOPE:

Incline			Inclined Area Per Square Foot of Horizontal Area	Percentage Increase In Area Over Flat Roof
Inches Per Foot Horizontal	Angle With Horizontal			
	Degree	Minute		
FLAT ROOFS –				
1/8	0	36	1.000	0.0
1/4	1	12	1.000	0.0
3/8	1	47	1.000	0.0
1/2	2	23	1.001	0.1
5/8	2	59	1.001	0.1
3/4	3	35	1.002	0.2
1	4	46	1.003	0.3
1 1/8	5	21	1.004	0.4
1 1/4	5	57	1.005	0.5
1 1/2	7	08	1.008	0.8
1 3/4	8	18	1.011	1.1
2	9	28	1.014	1.4
STEEP ROOFS –				
2 1/4	10	37	1.017	1.7
2 1/2	11	46	1.021	2.1
2 3/4	12	54	1.026	2.6
3	14	02	1.031	3.1
3 1/4	15	09	1.036	3.6
3 1/2	16	16	1.042	4.2
3 3/4	17	21	1.048	4.8
4	18	26	1.054	5.4
4 1/4	19	30	1.061	6.1
4 1/2	20	34	1.068	6.8
5	22	37	1.083	8.3
6	26	34	1.118	11.8
7	30	16	1.158	15.8
8	33	42	1.202	20.2
9	36	52	1.250	25.0
10	39	48	1.302	30.2
11	42	31	1.356	35.6
12	45	00	1.414	41.4

VARIATIONS OF ROOF AREA WITH SLOPE – *continued*

Incline			*Inclined Area Per Square Foot of Horizontal Area*	*Percentage Increase In Area Over Flat Roof*
Inches Per Foot Horizontal	*Angle With Horizontal*			
	Degree	*Minute*		
EXTRA STEEP ROOFS –				
14	49	24	1.537	53.7
16	53	08	1.667	66.7
18	56	19	1.803	80.3
20	59	02	1.943	94.3
22	61	23	2.088	108.8
24	63	26	2.235	123.5

SHEET METALS:

CORROSION OF METALS:

'ELECTROLYTIC ACTION' – 'GALVANIC CORROSION' FROM SEELYE:

Group Number	*Corroded End Anode Positive*	*Symbol*
(1)	Magnesium	Mg
	Aluminium	Al
(2)	Zinc	Zn
	Cadmium	Cd
(3)	Iron	Fe
	Chromium-Iron (active)	
	Chromium-Nickel-Iron (active)	
(4)	Soft Solder	
	Tin	Sn
	Lead	Pb
(5)	Nickel	Ni
	Brasses	
	Bronzes	
	Nickel-Copper Alloys	
	Copper	Cu
(6)	Chromium-Iron (passive)	
	Chromium-Nickel-Iron (passive)	
	Silver Solder	
	Silver	Ag
	Gold	Au
	Platinum	Pt
	Negative	
	Cathode	
	Protected End.	

This series is built upon actual experience with corrosion, and laboratory measurement.

Metals shown grouped together have little tendency to produce galvanic corrosion on one another.

In general, the greater the distance between any two metals on the list, the greater will be the tendency towards corrosion if these metals are connected.

When galvanic corrosion takes place between two metals on the list, in general it will be the one higher on the list that will be corroded.

The Chromium-Iron and Chromium-Nickel-Iron alloys (stainless steels) may change position as indicated. The factors governing this phenomenon are too complex to permit prediction of probable results within the scope of this list.

The series as it stands is correct for many dilute water solutions such as sea water, weak acids, and alkalies.

CORRUGATED GALVANISED STEEL SHEETS (8 — 3"):

Gauge	Length (Feet)							
	5	6	7	8	9	10	11	12
APPROXIMATE WEIGHT PER SHEET (POUNDS) –								
18	26.18	31.36	36.54	41.72	46.90	52.08	57.27	62.45
20	21.21	25.40	29.60	33.80	38.00	42.19	46.39	50.59
22	17.18	20.58	23.98	27.38	30.78	34.18	37.58	40.98
24	13.89	16.64	19.39	22.14	24.89	27.64	30.38	33.13
26	9.55	11.45	13.36	15.26	17.16	19.06	20.97	22.87
COUNT OF SHEETS PER NOMINAL TON –								
18	86	72	62	54	48	44	40	36
20	106	88	76	66	58	54	48	44
22	130	108	94	82	72	66	60	54
24	160	136	116	100	92	80	72	68
26	235	195	165	150	130	120	105	100
COVERAGE *(Mean area of surface covered by 1 ton of sheet – 1½ corrugations side lap, 6" end lap)* **SQUARE FEET –**								
18	726	743	756	759	765	784	788	776
20	894	908	926	928	924	962	945	949
22	1097	1114	1146	1153	1148	1176	1181	1164
24	1350	1403	1414	1406	1466	1425	1418	1466
26	1983	2011	2011	2109	2072	2138	2067	2156

Note: Following long-established British practice, 26 gauge galvanised steel sheet, both corrugated and plain, manufactured in Australia, is lighter than true 26 gauge.

GALVANISED AND ZINCANNEAL FLAT SHEETS:

Gauge	*Approximate Weight Per Sheet (Pounds)*				*Count of Sheets Per Nominal Ton*			
	Width (Inches)				*Width (Inches)*			
	30	*36*	*42*	*48*	*30*	*36*	*42*	*48*
SIX FOOT LENGTHS –								
12	62.25	74.64	87.04	99.44	36	30	26	23
14	49.48	59.33	69.19	79.04	45	38	32	28
16	39.56	47.44	55.32	63.20	57	47	40	35
18	31.50	37.77	44.05	50.32	70	60	51	44
20	25.30	30.34	35.38	40.42	88	74	63	56
22	20.33	24.37	28.42	32.47	110	92	79	68
24	16.30	19.55	22.80	26.04	138	114	98	86
26	11.25	13.49	15.73	17.97	200	166	141	124
26Z A	13.11	15.72	18.33	20.94	171	142	122	107
EIGHT FOOT LENGTHS –								
12	82.82	99.31	115.81	132.30	28	23	19	17
14	65.83	78.94	92.05	105.16	34	28	24	21
16	52.63	63.12	73.60	84.08	43	35	30	27
18	41.91	50.26	58.61	66.95	54	44	38	34
20	33.66	40.37	47.07	53.78	66	56	48	42
22	27.04	32.43	37.81	43.20	82	68	59	52
24	21.69	26.01	30.33	34.65	103	86	74	64
26	14.98	17.97	20.95	23.94	150	124	106	94
26Z A	17.44	20.92	24.39	27.86	128	107	92	80

Note: Following long-established British practice, 26 gauge galvanised steel sheet, both corrugated and plain, manufactured in Australia is lighter than true 26 gauge and as Zincannael is now manufactured in 26 Birmingham gauge, both values are given in the above table.

WEIGHTS OF SHEET METALS:

POUNDS PER SQUARE FOOT:

S.W.G.	*Thickness (Inches)*	*Steel*	*Stainless Steel*	*Copper*	*Zinc (Brackets Indicate Zinc Gauge)*	*Aluminium*	*Lead*	*Brass*
7/0	0.500	20.37	20.00	23.250	-	7.04	29.67	22.25
6/0	0.464	18.90	18.56	21.563	-	6.53	-	20.648
5/0	0.432	17.60	17.28	20.094	-	6.08	25.95	19.224
4/0	0.400	16.30	16.00	18.594	-	5.63	-	17.800
3/0	0.372	15.16	14.88	17.313	-	5.24	22.25	16.540
2/0	0.348	14.18	13.92	16.188	-	4.90	18.54	15.486
1/0	0.324	13.20	12.96	15.063	-	4.57	-	14.418
1	0.300	12.23	12.00	13.950	-	4.23	-	13.350
2	0.276	11.25	11.04	12.834	-	3.89	-	12.282
3	0.252	10.27	10.08	11.718	-	3.55	14.83	11.214
4	0.232	9.45	9.28	10.788	-	3.27	-	10.324
5	0.212	8.65	8.48	9.858	-	2.97	-	9.434
6	0.192	7.83	7.68	8.928	-	2.71	11.13	8.544
7	0.176	7.18	7.04	8.184	-	2.48	10.00	7.832
8	0.160	6.53	6.40	7.440	-	2.26	-	7.120
9	0.144	5.87	5.76	6.696	-	2.03	-	6.408
10	0.128	5.22	5.12	5.952	-	1.80	7.42	5.696

WEIGHTS OF SHEET METALS – *continued*

POUNDS PER SQUARE FOOT:

S.W.G.	*Thickness (Inches)*	*Steel*	*Stainless Steel*	*Copper*	*Zinc (Brackets Indicate Zinc Gauge)*	*Aluminium*	*Lead*	*Brass*
11	0.116	4.73	4.64	5.394	–	1.64	7.00	5.162
12	0.104	4.24	4.16	4.836	–	1.47	6.00	4.627
13	0.092	3.75	3.68	4.278	–	1.30	5.56	4.094
14	0.082	3.26	3.20	3.720	–	1.13	5.00	3.560
15	0.072	2.94	2.88	3.348	2.62 (21)	1.02	4.50	3.204
16	0.064	2.61	2.56	2.976	2.36 (20)	0.902	3.71	2.848
17	0.056	2.28	2.24	2.604	2.13 (19)	0.790	3.50	2.492
18	0.048	1.96	1.92	2.232	1.72 (18)	0.677	3.00	2.136
19	0.040	1.63	1.60	1.860	1.54 (17)	0.564	2.50	1.780
20	0.036	1.47	1.44	1.674	1.35 (16)	0.508	1.85	1.602
21	0.032	1.31	1.28	1.488	1.16 (15)	0.451	–	1.424
22	0.028	1.14	1.12	1.302	1.05 (14)	0.395	–	1.246
23	0.024	0.979	1.07	1.116	0.936 (12)	0.338	–	1.068
24	0.022	0.897	0.905	1.023	0.824 (11)	0.310	–	0.979
25	0.020	0.816	0.825	0.930	0.712 (10)	0.282	–	0.890
26	0.018	0.734	0.74	0.837	–	0.254	–	0.801
27	0.0164	0.669	0.68	0.762	0.637 (9)	0.231	–	0.792
28	0.0148	0.604	0.62	0.688	0.562 (8)	0.209	0.875	0.658
29	0.0136	0.555	0.569	0.632	0.487 (7)	0.192	–	0.605
30	0.0124	0.506	0.516	0.576	–	0.175	0.750	0.551

WEIGHTS OF SHEET METALS – *continued*

POUNDS PER SQUARE FOOT:

S.W.G.	*Thickness (Inches)*	*Steel*	*Stainless Steel*	*Copper*	*Zinc (Brackets Indicate Zinc Gauge)*	*Aluminium*	*Lead*	*Brass*
31	0.0116	0.473	–	0.539	–	0.164	–	0.516
32	0.0108	0.440	–	0.502	0.412 (6)	0.152	0.625	0.480
33	0.0100	0.428	–	0.465	0.374 (5)	0.148	–	0.445
34	0.0092	0.375	–	0.427	–	0.130	–	0.409
35	0.0084	0.343	–	0.390	0.299 (4)	0.118	0.500	0.373
36	0.0076	0.310	–	0.353	–	0.107	–	0.338
37	0.0068	0.277	–	0.316	0.263 (3)	0.096	–	0.302
38	0.0060	0.245	–	0.279	0.225 (2)	0.085	–	0.267
39	0.0052	0.212	–	0.241	–	0.073	0.313	0.231
40	0.0048	0.196	–	0.223	–	0.068	–	0.213
41	0.0044	0.179	–	0.204	–	0.062	–	0.195
42	0.0040	0.163	–	0.186	0.150 (1)	0.056	0.250	0.178
43	0.0036	0.147	–	–	–	0.050	–	0.160
44	0.0032	0.131	–	–	–	0.045	–	0.142
45	0.0028	0.114	–	–	–	0.040	–	0.124
46	0.0026	0.098	–	–	–	0.034	–	0.106
47	0.0020	0.082	–	–	–	0.028	0.125	0.089
48	0.0016	0.063	–	–	–	0.023	–	0.071
49	0.0012	0.049	–	–	–	0.017	–	0.053
50	0.0010	0.040	–	–	–	0.014	0.070	0.044

WEIGHTS OF TERNE PLATES:

Gauge	*Weight Per Square Foot (Pounds)*
16	2.5319
18	2.0015
20	1.6012
22	1.2769
24	1.0121
26	0.8020
28	0.6394

WEIGHTS OF ZINC SHEETS:

Zinc Gauge Number	**Approximate Weights Per Square Foot (Ounces)*	*Thickness in Decimals of an Inch*	*7 x 3 Feet*			*8 x 3 Feet*			*Nearest Imperial Standard Wire Gauge*
			Approximate Weight Per Sheet		*Number of Sheets in One Ton*	*Approximate Weight Per Sheet*		*Number of Sheets in One Ton*	
			(Pounds)	*(Ounces)*		*(Pounds)*	*(Ounces)*		
1	2.4	0.004	–	–	–	–	–	–	42
2	3.6	0.006	–	–	–	–	–	–	38
3	4.2	0.007	5	8	407	6	3	362	37
4	4.70	0.008	6	5	356	7	3	311	35
5	5.99	0.010	7	14	285	9	–	249	33
6	6.59	0.011	8	10	259	9	14	227	32
7	7.79	0.013	10	4	219	11	11	192	29
8	8.99	0.015	11	13	190	13	8	166	28
9	10.19	0.017	13	6	168	15	5	147	27
10	11.30	0.019	14	15	150	17	1	131	25
11	13.18	0.022	17	5	129	19	12	113	24
12	14.08	0.025	19	11	114	22	8	100	23
13	16.78	0.028	22	–	102	25	3	89	22
14	18.58	0.031	24	6	92	27	14	80	21
15	21.57	0.036	28	5	79	32	6	69	20
16	24.57	0.041	32	4	69	36	14	61	19
17	27.57	0.046	36	3	62	41	6	54	18
18	30.56	0.051	40	2	56	45	14	49	–
19	34.16	0.057	44	13	50	51	4	44	17
20	37.76	0.063	49	9	45	56	10	40	16
21	41.95	0.070	55	1	41	62	15	36	15

Notes: * 1 square foot x 1 inch thick = 37.456 pounds (specific gravity 7.2).

Sheets thicker than number 21 zinc gauge are rolled to the Imperial standard wire gauge, or to definite decimals of an inch.

B.S. 849:1939 lays down that each sheet shall be branded with its English zinc gauge number and the corresponding standard wire gauge number.

STRUCTURAL ALUMINIUM:

Note: Weights per foot given in the following tables of this Section are based on a specific gravity of 2.8. Conversion factors for various alloys are given in the appendix of B.S. 1161: 1951.

WEIGHTS OF ANGLES (EQUAL):

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
$\frac{3}{4}$ x $\frac{3}{4}$	0.125	0.22
1 x 1	0.125	0.29
1 x 1	0.1875	0.42
$1\frac{1}{4}$ x $1\frac{1}{4}$	0.125	0.37
$1\frac{1}{4}$ x $1\frac{1}{4}$	0.1875	0.54
$1\frac{1}{2}$ x $1\frac{1}{2}$	0.125	0.45
$1\frac{1}{2}$ x $1\frac{1}{2}$	0.1875	0.65
$1\frac{1}{2}$ x $1\frac{1}{2}$	0.25	0.85
$1\frac{3}{4}$ x $1\frac{3}{4}$	0.125	0.53
$1\frac{3}{4}$ x $1\frac{3}{4}$	0.1875	0.77
$1\frac{3}{4}$ x $1\frac{3}{4}$	0.25	1.00
2 x 2	0.125	0.60
2 x 2	0.1875	0.88
2 x 2	0.25	1.15
2 x 2	0.3125	1.42
$2\frac{1}{4}$ x $2\frac{1}{4}$	0.1875	1.00
$2\frac{1}{4}$ x $2\frac{1}{4}$	0.25	1.31
$2\frac{1}{4}$ x $2\frac{1}{4}$	0.3125	1.61
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.1875	1.12
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.25	1.46
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.3125	1.80
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.375	2.13
3 x 3	0.25	1.77
3 x 3	0.3125	2.18
3 x 3	0.375	2.59
3 x 3	0.5	3.36
$3\frac{1}{2}$ x $3\frac{1}{2}$	0.25	2.08
$3\frac{1}{2}$ x $3\frac{1}{2}$	0.3125	2.57
$3\frac{1}{2}$ x $3\frac{1}{2}$	0.375	3.05
$3\frac{1}{2}$ x $3\frac{1}{2}$	0.5	4.00
4 x 4	0.3125	2.95
4 x 4	0.375	3.51
4 x 4	0.5	4.59
4 x 4	0.625	5.63
$4\frac{1}{2}$ x $4\frac{1}{2}$	0.375	3.97
$4\frac{1}{2}$ x $4\frac{1}{2}$	0.5	5.20
$4\frac{1}{2}$ x $4\frac{1}{2}$	0.625	6.40
5 x 5	0.375	4.43
5 x 5	0.5	5.82
5 x 5	0.625	7.17
6 x 6	0.375	5.36

WEIGHTS OF ANGLES (EQUAL) – *continued*

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
6 x 6	0.5	7.05
6 x 6	0.625	8.70
6 x 6	0.75	10.31
7 x 7	0.5	8.28
7 x 7	0.625	10.23
7 x 7	0.75	12.15
8 x 8	0.50	9.51
8 x 8	0.75	13.99
9 x 9	0.50	10.74
9 x 9	0.75	15.83

WEIGHTS OF ANGLES (UNEQUAL) – *continued*

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
1½ x 1	0.125	0.37
1½ x 1	0.1875	0.54
2 x 1	0.125	0.45
2 x 1½	0.125	0.53
2 x 1½	0.1875	0.77
2 x 1½	0.25	1.00
2½ x 1½	0.125	0.60
2½ x 1½	0.1875	0.88
2½ x 1½	0.25	1.15
2½ x 2	0.125	0.68
2½ x 2	0.1875	1.00
2½ x 2	0.25	1.31
2½ x 2	0.3125	1.61
3 x 2	0.1875	1.12
3 x 2	0.25	1.46
3 x 2	0.3125	1.80
3 x 2	0.375	2.13
3 x 2½	0.25	1.62
3 x 2½	0.3125	1.99
3 x 2½	0.375	2.36
3½ x 2½	0.25	1.77
3½ x 2½	0.3125	2.18
3½ x 2½	0.375	2.59
3½ x 3	0.25	1.93
3½ x 3	0.3125	2.38
3½ x 3	0.375	2.82
3½ x 3	0.5	3.67
4 x 2½	0.25	1.93
4 x 2½	0.3125	2.38
4 x 2½	0.375	2.82
4 x 3	0.25	2.08
4 x 3	0.3125	2.57
4 x 3	0.375	3.05
4 x 3	0.5	3.98
4 x 3½	0.3125	2.76
4 x 3½	0.375	3.28
4 x 3½	0.5	4.28
4½ x 3	0.3125	2.76
4½ x 3	0.375	3.28
4½ x 3	0.5	4.28
5 x 3	0.3125	2.95

WEIGHTS OF ANGLES (UNEQUAL) - *continued*

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
5 x 3	0.375	3.51
5 x 3	0.5	4.59
5 x 3½	0.375	3.74
5 x 3½	0.5	4.90
5 x 4	0.375	3.97
5 x 4	0.5	5.20
6 x 3	0.375	3.97
6 x 3	0.5	5.20
6 x 3½	0.375	4.20
6 x 3½	0.5	5.51
6 x 4	0.375	4.43
6 x 4	0.5	5.82
6 x 4	0.625	7.17
7 x 3½	0.4375	5.40
7 x 3½	0.5	6.13
7 x 4	0.5	6.43
7 x 4	0.625	7.93
8 x 3½	0.4375	5.94
8 x 3½	0.5	6.74
8 x 4	0.5	7.05
8 x 4	0.625	8.70
8 x 6	0.5	8.28
8 x 6	0.75	12.15
8 x 6	0.875	14.03
9 x 4	0.5	7.66
9 x 4	0.75	11.23
9 x 4	0.875	12.96
10 x 4	0.5	8.28
10 x 4	0.75	12.15
11 x 5	0.5	9.51
11 x 5	0.75	13.99
12 x 6	0.5	10.74
12 x 6	0.75	15.83

WEIGHTS OF BULB ANGLES (EQUAL):

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
$1\frac{1}{2}$ x $1\frac{1}{2}$	0.0750	0.375
$1\frac{3}{4}$ x $1\frac{3}{4}$	0.0875	0.511
2 x 2	0.100	0.668
$2\frac{1}{4}$ x $2\frac{1}{4}$	0.1125	0.845
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.125	1.04
$2\frac{3}{4}$ x $2\frac{3}{4}$	0.1375	1.26
3 x 3	0.150	1.50
$3\frac{1}{4}$ x $3\frac{1}{4}$	0.1625	1.76
$3\frac{1}{2}$ x $3\frac{1}{2}$	0.175	2.04
$3\frac{3}{4}$ x $3\frac{3}{4}$	0.1875	2.34
4 x 4	0.200	2.67
$4\frac{1}{2}$ x $4\frac{1}{2}$	0.225	3.38
5 x 5	0.250	4.17
$5\frac{1}{2}$ x $5\frac{1}{2}$	0.275	5.04
6 x 6	0.300	6.00
$6\frac{1}{2}$ x $6\frac{1}{2}$	0.325	7.05
7 x 7	0.350	8.17

WEIGHTS OF BULB ANGLES (UNEQUAL) – *continued*

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
$1\frac{1}{2}$ x $1\frac{1}{8}$	0.0750	0.341
$1\frac{3}{4}$ x $1\frac{5}{16}$	0.0875	0.464
2 x $1\frac{1}{2}$	0.1000	0.608
$2\frac{1}{4}$ x $1\frac{11}{16}$	0.1125	0.769
$2\frac{1}{2}$ x $1\frac{7}{8}$	0.125	0.948
$2\frac{3}{4}$ x $2\frac{1}{16}$	0.1375	1.15
3 x $2\frac{1}{4}$	0.150	1.36
$3\frac{1}{4}$ x $2\frac{7}{16}$	0.1625	1.60
$3\frac{1}{2}$ x $2\frac{5}{8}$	0.175	1.86
$3\frac{3}{4}$ x $2\frac{13}{16}$	0.1875	2.13
4 x 3	0.200	2.43
$4\frac{1}{2}$ x $3\frac{3}{8}$	0.225	3.07
5 x $3\frac{3}{4}$	0.250	3.79
$5\frac{1}{2}$ x $4\frac{1}{8}$	0.275	4.59
6 x $4\frac{1}{2}$	0.300	5.46
$6\frac{1}{2}$ x $4\frac{7}{8}$	0.325	6.40
7 x $5\frac{1}{4}$	0.350	7.42
8 x 6	0.400	9.71

WEIGHTS OF CHANNELS:

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*		*Weight (Pounds Per Foot)*
	Web	*Flange*	
3 x 1½	0.25	0.3125	1.91
3½ x 1½	0.25	0.3125	2.06
4 x 2	0.25	0.3125	2.61
5 x 2	0.25	0.3125	2.92
5 x 2½	0.25	0.375	3.66
6 x 2	0.25	0.3125	3.22
6 x 2½	0.25	0.3125	3.62
6 x 3	0.25	0.375	4.45
6 x 3	0.375	0.50	6.04
6 x 3½	0.3125	0.50	6.30
7 x 2	0.25	0.375	3.79
7 x 2½	0.3125	0.4375	5.08
7 x 3	0.25	0.4375	5.17
7 x 3½	0.3125	0.50	6.68
8 x 2½	0.3125	0.4375	5.46
8 x 3	0.3125	0.50	6.42
8 x 3½	0.375	0.5625	8.07
9 x 3	0.375	0.50	7.41
9 x 3½	0.375	0.50	8.05
10 x 3	0.375	0.50	7.87
10 x 3½	0.4375	0.5625	9.65
11 x 3	0.4375	0.50	9.08
11 x 3½	0.50	0.625	11.39
12 x 3	0.50	0.625	11.21
12 x 3½	0.50	0.625	12.00
12 x 4	0.50	0.625	12.79

WEIGHTS OF I SECTIONS:

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*		*Weight (Pounds Per Foot)*
	Web	*Flange*	
3 x $1\frac{1}{2}$	0.1875	0.25	1.55
3 x 3	0.1875	0.25	2.53
$3\frac{1}{2}$ x $1\frac{1}{2}$	0.1875	0.25	1.66
4 x $1\frac{3}{4}$	0.1875	0.25	1.94
4 x 3	0.1875	0.25	2.76
$4\frac{1}{2}$ x 2	0.1875	0.25	2.21
$4\frac{3}{4}$ x $1\frac{3}{4}$	0.25	0.375	2.89
5 x 2	0.1875	0.25	2.33
5 x $2\frac{1}{2}$	0.25	0.375	3.68
5 x 3	0.25	0.375	4.17
5 x $3\frac{1}{2}$	0.25	0.375	4.66
6 x $2\frac{1}{2}$	0.25	0.375	3.99
6 x 3	0.25	0.375	4.47
7 x 3	0.3125	0.4375	5.66
7 x 4	0.3125	0.4375	6.79
8 x 4	0.3125	0.4375	7.17
8 x $4\frac{1}{2}$	0.4375	0.50	9.44
8 x 5	0.4375	0.625	11.47
9 x 4	0.375	0.4375	8.17
9 x $4\frac{1}{2}$	0.375	0.50	9.36
10 x $4\frac{1}{2}$	0.4375	0.50	10.50
10 x 5	0.4375	0.5625	11.84
11 x 5	0.4375	0.5625	12.38
11 x 5	0.4375	0.625	13.07
12 x 5	0.4375	0.5625	12.91
12 x 6	0.50	0.5625	15.20
12 x 6	0.50	0.6875	16.87
12 x 6	0.50	0.75	17.70

WEIGHTS OF LIPPED CHANNELS:

ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
$2\frac{1}{2}$ x $1\frac{1}{4}$	0.0781	0.548
$2\frac{3}{4}$ x $1\frac{3}{8}$	0.0859	0.663
3 x $1\frac{1}{2}$	0.0937	0.790
$3\frac{1}{4}$ x $1\frac{5}{8}$	0.102	0.936
$3\frac{1}{2}$ x $1\frac{3}{4}$	0.109	1.07
$3\frac{3}{4}$ x $1\frac{7}{8}$	0.117	1.23
4 x 2	0.125	1.41
$4\frac{1}{4}$ x $2\frac{1}{8}$	0.133	1.58
$4\frac{1}{2}$ x $2\frac{1}{4}$	0.141	1.79
$4\frac{3}{4}$ x $2\frac{3}{8}$	0.148	1.97
5 x $2\frac{1}{2}$	0.156	2.19
$5\frac{1}{2}$ x $2\frac{3}{4}$	0.172	2.66
6 x 3	0.187	3.15
$6\frac{1}{2}$ x $3\frac{1}{4}$	0.203	3.71
7 x $3\frac{1}{2}$	0.219	4.31
$7\frac{1}{2}$ x $3\frac{3}{4}$	0.234	4.92
8 x 4	0.250	5.61

WEIGHTS OF T SECTIONS:
ALUMINIUM:

Size (Inches)	*Thickness (Inches)*	*Weight (Pounds Per Foot)*
1 x 1	0.125	0.30
$1\frac{1}{4}$ x $1\frac{1}{4}$	0.1875	0.55
$1\frac{1}{4}$ x $1\frac{1}{4}$	0.25	0.70
$1\frac{1}{2}$ x $1\frac{1}{2}$	0.125	0.46
$1\frac{1}{2}$ x $1\frac{1}{2}$	0.25	0.86
$1\frac{1}{2}$ x 2	0.125	0.54
$1\frac{1}{2}$ x 2	0.1875	0.78
$1\frac{3}{4}$ x $2\frac{1}{2}$	0.1875	0.96
2 x 2	0.1875	0.90
2 x 2	0.25	1.17
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.1875	1.13
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.25	1.48
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.3125	1.82
$2\frac{1}{2}$ x $2\frac{1}{2}$	0.375	2.15
3 x 3	0.25	1.79
3 x 3	0.375	2.61
3 x $3\frac{1}{2}$	0.3125	2.40
3 x 4	0.25	2.11
3 x 4	0.3125	2.60
4 x 3	0.25	2.11
4 x 3	0.3125	2.60
4 x 3	0.375	3.08
4 x 3	0.5	4.01
4 x 4	0.3125	2.99
4 x 4	0.375	3.54
4 x 4	0.5	4.62
5 x 3	0.375	3.54
5 x 3	0.5	4.62
5 x 4	0.375	4.01
5 x 4	0.5	5.24
6 x 3	0.375	4.01
6 x 3	0.5	5.24
6 x 4	0.5	5.86
6 x 4	0.625	7.21
6 x 6	0.5	7.11
6 x 6	0.625	8.76
7 x 7	0.5	8.35
7 x 7	0.625	10.31
8 x 8	0.5	9.60
8 x 8	0.625	11.86
9 x 9	0.5	10.86
9 x 9	0.625	13.42

STRUCTURAL STEEL:

WEIGHTS OF ANGLES (EQUAL):

MERCHANTS' CHARTS:

STEEL:

Size (Inches)	Weight (Pounds Per Foot)	Size (Inches)	Weight (Pounds Per Foot)
1 x 1 x 1/4	1.49	3 x 3 x 1/2	9.35
1 x 1 x 3/16	1.15	3 x 3 x 3/8	7.17
1 x 1 x 1/8	0.80	3 x 3 x 5/16	6.05
1 1/4 x 1 1/4 x 5/16	2.34	3 x 3 x 1/4	4.89
1 1/4 x 1 1/4 x 1/4	1.91	3 x 3 x 3/16	3.73
1 1/4 x 1 1/4 x 3/16	1.48	3 1/2 x 3 1/2 x 5/8	13.55
1 1/4 x 1 1/4 x 1/8	1.02	3 1/2 x 3 1/2 x 1/2	11.05
1 1/2 x 1 1/2 x 5/16	2.85	3 1/2 x 3 1/2 x 3/8	8.45
1 1/2 x 1 1/2 x 1/4	2.34	3 1/2 x 3 1/2 x 5/16	7.11
1 1/2 x 1 1/2 x 3/16	1.79	3 1/2 x 3 1/2 x 1/4	5.74
1 1/2 x 1 1/2 x 1/8	1.23	4 x 4 x 5/8	15.67
1 3/4 x 1 3/4 x 3/8	4.02	4 x 4 x 1/2	12.75
1 3/4 x 1 3/4 x 5/16	3.39	4 x 4 x 3/8	9.72
1 3/4 x 1 3/4 x 1/4	2.76	4 x 4 x 5/16	8.17
1 3/4 x 1 3/4 x 3/16	2.11	5 x 5 x 3/4	23.59
1 3/4 x 1 3/4 x 1/8	1.46	5 x 5 x 5/8	19.93
2 x 2 x 3/8	4.62	5 x 5 x 1/2	16.16
2 x 2 x 5/16	3.92	5 x 5 x 3/8	12.28
2 x 2 x 1/4	3.19	5 x 5 x 5/16	10.30
2 x 2 x 3/16	2.43	6 x 6 x 1	37.40
2 x 2 x 1/8	1.67	6 x 6 x 7/8	33.04
2 1/4 x 2 1/4 x 3/8	5.26	6 x 6 x 3/4	28.69
2 1/4 x 2 1/4 x 5/16	4.45	6 x 6 x 5/8	24.17
2 1/4 x 2 1/4 x 1/4	3.61	6 x 6 x 9/16	21.86
2 1/4 x 2 1/4 x 3/16	2.77	6 x 6 x 1/2	19.55
2 1/2 x 2 1/2 x 1/2	7.65	6 x 6 x 7/16	17.19
2 1/2 x 2 1/2 x 3/8	5.90	6 x 6 x 3/8	14.82
2 1/2 x 2 1/2 x 5/16	4.98	8 x 8 x 1	51.01
2 1/2 x 2 1/2 x 1/4	4.04	8 x 8 x 7/8	45.00
2 1/2 x 2 1/2 x 3/16	3.10	8 x 8 x 3/4	38.89
3 x 3 x 5/8	11.42	8 x 8 x 5/8	32.68

WEIGHTS OF ANGLES (EQUAL) - *continued*

B.S. 4: PART 1: 1962:

STEEL:

Size (Inches)	*Weight (Pounds Per Foot)*	*Size (Inches)*	*Weight (Pounds Per Foot)*
1 x 1 x 1/8	0.8	3 1/2 x 3 1/2 x 1/2	11.0
1 x 1 x 3/16	1.15	3 1/2 x 3 1/2 x 9/16	12.3
1 x 1 x 1/4	1.5	3 1/2 x 3 1/2 x 5/8	13.5
1 1/4 x 1 1/4 x 1/8	1.0	4 x 4 x 5/16	8.1
1 1/4 x 1 1/4 x 3/16	1.45	4 x 4 x 3/8	9.7
1 1/4 x 1 1/4 x 1/4	1.9	4 x 4 x 7/16	11.2
1 1/2 x 1 1/2 x 3/16	1.8	4 x 4 x 1/2	12.7
1 1/2 x 1 1/2 x 1/4	2.35	4 x 4 x 9/16	14.2
1 1/2 x 1 1/2 x 5/16	2.85	4 x 4 x 5/8	15.7
1 3/4 x 1 3/4 x 3/16	2.1	4 x 4 x 11/16	17.1
1 3/4 x 1 3/4 x 1/4	2.7	4 x 4 x 3/4	18.5
1 3/4 x 1 3/4 x 5/16	3.4	5 x 5 x 3/8	12.3
2 x 2 x 3/16	2.4	5 x 5 x 7/16	14.2
2 x 2 x 1/4	3.2	5 x 5 x 1/2	16.1
2 x 2 x 5/16	3.9	5 x 5 x 9/16	18.0
2 x 2 x 3/8	4.6	5 x 5 x 5/8	19.9
2 1/4 x 2 1/4 x 3/16	2.7	5 x 5 x 11/16	21.8
2 1/4 x 2 1/4 x 1/4	3.6	5 x 5 x 3/4	23.6
2 1/4 x 2 1/4 x 5/16	4.4	6 x 6 x 3/8	14.8
2 1/4 x 2 1/4 x 3/8	5.2	6 x 6 x 7/16	17.2
2 1/2 x 2 1/2 x 1/4	4.0	6 x 6 x 1/2	19.5
2 1/2 x 2 1/2 x 5/16	5.0	6 x 6 x 9/16	21.9
2 1/2 x 2 1/2 x 3/8	5.9	6 x 6 x 5/8	24.2
2 1/2 x 2 1/2 x 7/16	6.8	6 x 6 x 11/16	26.4
2 1/2 x 2 1/2 x 1/2	7.6	6 x 6 x 3/4	28.7
3 x 3 x 1/4	4.8	6 x 6 x 13/16	30.9
3 x 3 x 5/16	6.0	6 x 6 x 7/8	33.1
3 x 3 x 3/8	7.1	8 x 8 x 5/8	32.7
3 x 3 x 7/16	8.2	8 x 8 x 11/16	35.8
3 x 3 x 1/2	9.3	8 x 8 x 3/4	38.9
3 x 3 x 9/16	10.4	8 x 8 x 13/16	42.0
3 1/2 x 3 1/2 x 1/4	5.7	8 x 8 x 7/8	45.0
3 1/2 x 3 1/2 x 5/16	7.1	8 x 8 x 15/16	48.0
3 1/2 x 3 1/2 x 3/8	8.4	8 x 8 x 1	51.0
3 1/2 x 3 1/2 x 7/16	9.7		

WEIGHTS OF ANGLES (UNEQUAL) – *continued*

MERCHANTS' CHARTS:

STEEL:

Size (Inches)	*Weight (Pounds Per Foot)*	*Size (Inches)*	*Weight (Pounds Per Foot)*
2½ x 2 x ⅜	5.26	5 x 3 x ½	12.75
2½ x 2 x 5/16	4.45	5 x 3 x 7/16	11.30
2½ x 2 x ¼	3.61	5 x 3 x ⅜	9.72
2½ x 2 x 3/16	2.75	5 x 3 x 5/16	8.17
3 x 2 x ½	7.65	5 x 3 x ¼	6.60
3 x 2 x ⅜	5.90	5 x 4 x ¾	21.05
3 x 2 x 5/16	4.98	5 x 4 x ⅝	17.80
3 x 2 x ¼	4.04	5 x 4 x ½	14.45
3 x 2 x 3/16	3.03	5 x 4 x ⅜	11.00
3 x 2½ x ½	8.50	5 x 4 x 5/16	9.15
3 x 2½ x ⅜	6.54	6 x 3 x ¾	21.05
3 x 2½ x 5/16	5.51	6 x 3 x ⅝	17.80
3 x 2½ x ¼	4.46	6 x 3 x ½	14.45
3 x 2½ x 3/16	3.40	6 x 3 x ⅜	11.00
3½ x 2½ x ½	9.35	6 x 3½ x ¾	22.31
3½ x 2½ x ⅜	7.17	6 x 3½ x ⅝	18.86
3½ x 2½ x 5/16	6.05	6 x 3½ x ½	15.30
3½ x 2½ x ¼	4.89	6 x 3½ x 7/16	13.54
3½ x 2½ x 3/16	3.74	6 x 3½ x ⅜	11.63
3½ x 3 x ⅝	12.49	6 x 3½ x 5/16	9.32
3½ x 3 x ½	10.20	6 x 4 x 1	30.60
3½ x 3 x ⅜	7.81	6 x 4 x ⅞	27.10
3½ x 3 x 5/16	6.58	6 x 4 x ¾	23.59
3½ x 3 x ¼	5.32	6 x 4 x ⅝	19.93
4 x 3 x ⅝	13.55	6 x 4 x ½	16.16
4 x 3 x ½	11.05	6 x 4 x ⅜	12.28
4 x 3 x 7/16	9.83	6½ x 4½ x ¾	26.13
4 x 3 x ⅜	8.45	6½ x 4½ x ⅝	22.04
4 x 3 x 5/16	7.11	6½ x 4½ x ½	17.84
4 x 3 x ¼	5.75	6½ x 4½ x ⅜	13.54
5 x 3 x ⅝	15.67		

WEIGHTS OF ANGLES (UNEQUAL) – *continued*

B.S. 4: PART 1: 1962:

STEEL:

Size (Inches)	*Weight (Pounds Per Foot)*	*Size (Inches)*	*Weight (Pounds Per Foot)*
2 x 1½ x 3/16	2.1	5 x 3½ x 5/16	8.7
2 x 1½ x ¼	2.7	5 x 3½ x 3/8	10.3
2 x 1½ x 5/16	3.4	5 x 3½ x 7/16	12.0
2½ x 1½ x 3/16	2.4	5 x 3½ x ½	13.6
2½ x 1½ x ¼	3.2	5 x 3½ x 9/16	15.2
2½ x 1½ x 5/16	3.9	5 x 3½ x 5/8	16.7
2½ x 2 x 3/16	2.7	6 x 3 x 5/16	9.2
2½ x 2 x ¼	3.6	6 x 3 x 3/8	11.0
2½ x 2 x 5/16	4.4	6 x 3 x 7/16	12.7
2½ x 2 x 3/8	5.2	6 x 3 x ½	14.4
3 x 2 x 3/16	3.1	6 x 3 x 9/16	16.1
3 x 2 x ¼	4.0	6 x 3 x 5/8	17.8
3 x 2 x 5/16	5.0	6 x 3½ x 5/16	9.7
3 x 2 x 3/8	5.9	6 x 3½ x 3/8	11.6
3 x 2 x 7/16	6.8	6 x 3½ x 7/16	13.5
3 x 2½ x ¼	4.4	6 x 3½ x ½	15.3
3 x 2½ x 5/16	5.5	6 x 3½ x 9/16	17.1
3 x 2½ x 3/8	6.5	6 x 3½ x 5/8	18.8
3 x 2½ x 7/16	7.5	6 x 4 x 3/8	12.3
3½ x 2½ x ¼	4.8	6 x 4 x 7/16	14.2
3½ x 2½ x 5/16	6.0	6 x 4 x ½	16.1
3½ x 2½ x 3/8	7.1	6 x 4 x 9/16	18.0
3½ x 2½ x 7/16	8.2	6 x 4 x 5/8	19.9
3½ x 3 x ¼	5.3	6 x 4 x 11/16	21.8
3½ x 3 x 5/16	6.5	6 x 4 x ¾	23.6
3½ x 3 x 3/8	7.8	7 x 3½ x 3/8	12.9
3½ x 3 x 7/16	9.0	7 x 3½ x 7/16	15.0
3½ x 3 x ½	10.2	7 x 3½ x ½	17.0
3½ x 3 x 9/16	11.3	7 x 3½ x 9/16	19.0
4 x 2½ x ¼	5.3	7 x 3½ x 5/8	21.0
4 x 2½ x 5/16	6.5	8 x 4 x ½	19.5
4 x 2½ x 3/8	7.8	8 x 4 x 9/16	21.9
4 x 2½ x 7/16	9.0	8 x 4 x 5/8	24.2
4 x 3 x 5/16	7.1	8 x 4 x 11/16	26.4
4 x 3 x 3/8	8.4	8 x 4 x ¾	28.7
4 x 3 x 7/16	9.7	8 x 6 x ½	22.9
4 x 3 x ½	11.0	8 x 6 x 9/16	25.7
4 x 3 x 9/16	12.3	8 x 6 x 5/8	28.4
4 x 3½ x 5/16	7.6	8 x 6 x 11/16	31.1
4 x 3½ x 3/8	9.1	8 x 6 x ¾	33.8
4 x 3½ x 7/16	10.5	8 x 6 x 13/16	36.4
4 x 3½ x ½	11.9	8 x 6 x ⅞	39.0
4 x 3½ x 9/16	13.2	9 x 4 x ½	21.2
4 x 3½ x 5/8	14.6	9 x 4 x 9/16	23.8
5 x 3 x 5/16	8.1	9 x 4 x 5/8	26.3
5 x 3 x 3/8	9.7	9 x 4 x 11/16	28.8
5 x 3 x 7/16	11.2	9 x 4 x ¾	31.2
5 x 3 x ½	12.7	9 x 4 x 13/16	33.7
5 x 3 x 9/16	14.2	9 x 4 x ⅞	36.1

WEIGHTS OF BULB ANGLES:

B.S. 4: PART 1: 1962:
STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*
4 x $2\frac{1}{2}$	6.29
5 x $2\frac{1}{2}$	8.49
5 x 3	9.03
$5\frac{1}{2}$ x 3	10.02
6 x 3	11.37
6 x $3\frac{1}{2}$	11.96
7 x 3	14.62
7 x $3\frac{1}{2}$	15.30
8 x 3	17.24
8 x $3\frac{1}{2}$	17.95
9 x $3\frac{1}{2}$	21.22
10 x $3\frac{1}{2}$	24.34
11 x $3\frac{1}{2}$	28.14
12 x $3\frac{1}{2}$	31.73
$13\frac{1}{2}$ x 4	38.98

WEIGHTS OF BULB FLATS:

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*
5	6.46
	7.31
	9.86
6	7.42
	8.44
	11.50
7	10.19
	11.38
	14.95
8	12.59
	13.95
	18.03
9	15.48
	17.01
	21.60
10	18.39
	20.09
	25.19
11	21.85
	23.72
	29.33
12	25.22
	27.26
	33.38
$13\frac{1}{2}$	31.19
	33.49
	40.37
15	37.82
	40.37
	48.02
17	47.38
	50.27
	58.94

WEIGHTS OF CHANNELS:

MERCHANTS' CHARTS:

STEEL:

Size (Inches)	*Weight (Pounds Per Foot)*
2 x 1	3.00
3 x 1½	4.60
4 x 2	7.09
5 x 2½	10.22
6 x 3	12.41
6 x 3½	16.48
7 x 3	14.22
8 x 3	15.96
8 x 3½	20.21
9 x 3	17.46
9 x 3½	22.27
10 x 3	19.28
10 x 3½	24.46
12 x 3½	26.37
12 x 3½	29.23
12 x 4	31.33
15 x 4	36.37
17 x 4	44.34

WEIGHTS OF CHANNELS – *continued*

B.S. 4: PART 1: 1962: STEEL:

Size (Inches)	*Weight (Pounds Per Foot)*
3 x 1½	4.5
4 x 2	7
5 x 2½	10
6 x 3	12
6 x 3½	16
7 x 3	14
7 x 3½	18
8 x 3	16
8 x 3½	20
9 x 3	17.5
9 x 3½	22
10 x 3	19
10 x 3½	24
12 x 3½	28
12 x 4	31
15 x 4	37
17 x 4	44

WEIGHTS OF CHEQUER PLATES:

POUNDS PER SQUARE FOOT:

STEEL:

Thickness (Inches)	*Weight (Pounds Feet)*
$\frac{3}{16}$	9.0
$\frac{1}{4}$	11.5
$\frac{5}{16}$	14.0
$\frac{3}{8}$	16.5
$\frac{7}{16}$	19.0
$\frac{1}{2}$	21.4

WEIGHTS OF CIRCULAR HOLLOW SECTIONS:

B.S. 4: PART 2: 1963:

STEEL:

Serial Size (Inches)	*Thickness (S.W.G. or (Inches)*	*Weight (Pounds Per Foot)*
$1\frac{1}{16}$	10	1.28
$1\frac{11}{32}$	12	1.38
	10	1.66
	8	2.02
$1\frac{11}{16}$	12	1.76
	10	2.13
	8	2.61
	5	3.34
$1\frac{29}{32}$	10	2.43
	8	2.98
	6	3.52
	4	4.15
$2\frac{3}{8}$	10	3.77
	9	3.43
	8	3.79
	7	4.13
	6	4.48
	$\frac{7}{32}$	5.04
	$\frac{1}{4}$	5.67
3	10	3.93
	9	4.39
	7	5.31
	5	6.31
	$\frac{1}{4}$	7.34
$3\frac{1}{2}$	10	4.61
	8	5.71
	6	6.78
	5	7.45
	$\frac{1}{4}$	8.68
4	8	6.56
	6	7.81
	$\frac{1}{4}$	10.00
$4\frac{1}{2}$	9	6.70
	7	8.13
	5	9.71
	4	10.6
	$\frac{1}{4}$	11.3
	$\frac{5}{16}$	14.0

WEIGHTS OF CIRCULAR HOLLOW SECTIONS – *continued*

B.S. 4: PART 2: 1963:

STEEL:

Serial Size (Inches)	*Thickness (S.W.G. or (Inches)*	*Weight (Pounds Per Foot)*
$5\frac{1}{2}$	7	10.0
	6	10.9
	5	12.0
	$\frac{1}{4}$	14.0
	$\frac{5}{16}$	17.3
	$\frac{3}{8}$	20.5
$6\frac{5}{8}$	7	12.1
	6	13.2
	5	14.5
	$\frac{1}{4}$	17.0
	$\frac{9}{32}$	19.1
	$\frac{5}{16}$	21.1
	$\frac{3}{8}$	25.0
$7\frac{5}{8}$	6	15.2
	5	16.8
	$\frac{1}{4}$	19.7
	$\frac{9}{32}$	22.1
	$\frac{5}{16}$	24.4
	$\frac{3}{8}$	29.0
$8\frac{5}{8}$	6	17.3
	5	19.1
	$\frac{1}{4}$	22.4
	$\frac{9}{32}$	25.1
	$\frac{5}{16}$	27.7
	$\frac{3}{8}$	33.0
	$\frac{7}{16}$	38.3
	$\frac{1}{2}$	43.4
$9\frac{5}{8}$	4	23.3
	$\frac{9}{32}$	28.1
	$\frac{5}{16}$	31.1
	$\frac{3}{8}$	37.0
$10\frac{3}{4}$	4	26.1
	$\frac{1}{4}$	28.0
	$\frac{9}{32}$	31.4
	$\frac{5}{16}$	34.8
	$\frac{3}{8}$	41.6
	$\frac{7}{16}$	48.2
	$\frac{1}{2}$	54.7

WEIGHTS OF CIRCULAR HOLLOW SECTIONS - *continued*

B.S. 4: PART 2: 1963:

STEEL:

Serial Size (Inches)	*Thickness (S.W.G. or (Inches)*	*Weight (Pounds Per Foot)*
$12\frac{3}{4}$	$\frac{1}{4}$	33.4
	$\frac{9}{32}$	37.5
	$\frac{5}{16}$	41.5
	$\frac{3}{8}$	49.6
	$\frac{7}{16}$	57.5
	$\frac{1}{2}$	65.4
14	$\frac{5}{16}$	45.7
	$\frac{3}{8}$	54.6
	$\frac{7}{16}$	63.4
16	$\frac{1}{4}$	42.1
	$\frac{9}{32}$	47.2
	$\frac{5}{16}$	52.4
	$\frac{3}{8}$	62.6
	$\frac{7}{16}$	72.7
	$\frac{1}{2}$	82.8
18	$\frac{1}{4}$	47.4
	$\frac{9}{32}$	53.2
	$\frac{5}{16}$	59.0
	$\frac{11}{32}$	64.8
	$\frac{3}{8}$	70.6
	$\frac{7}{16}$	82.1
	$\frac{1}{2}$	93.5
20	$\frac{1}{4}$	52.7
	$\frac{9}{32}$	59.2
	$\frac{5}{16}$	65.7
22	$\frac{1}{4}$	58.1
	$\frac{9}{32}$	65.2
	$\frac{5}{16}$	72.4
24	$\frac{1}{4}$	63.4
	$\frac{9}{32}$	71.3
	$\frac{5}{16}$	79.1
26	$\frac{9}{32}$	77.3
	$\frac{5}{16}$	85.7
	$\frac{3}{8}$	103

WEIGHTS OF CIRCULAR HOLLOW SECTIONS – *continued*

B.S. 4: PART 2: 1963:

STEEL:

Serial Size (Inches)	*Thickness (S.W.G. or (Inches)*	*Weight (Pounds Per Foot)*
28	9/32	83.3
	5/16	92.4
	3/8	111
30	5/16	99.1
	3/8	119
	7/16	138
32	5/16	106
	3/8	127
	7/16	147
34	5/16	112
	3/8	135
	7/16	157
36	5/16	119
	3/8	143
	7/16	166
40	3/8	159
	7/16	185
	1/2	211
43	3/8	171
	7/16	199
	1/2	227
49	3/8	195
	7/16	227
	1/2	259
55	7/16	255
	1/2	291
	9/16	327
61	1/2	323
	9/16	363
	5/8	403
67 1/4	9/16	401
	5/8	445
	11/16	489
73 1/4	5/8	485
	11/16	533
	3/4	581

WEIGHTS OF FLAT ROLLED STEEL:

POUNDS PER LINEAL FOOT:

Width (Inches)	*Thickness (Inches)*											
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	*1*
1/4	0.053	0.106	0.159	0.213	0.27	0.32	0.37	0.43	0.53	0.64	0.74	0.85
1/2	0.106	0.213	0.319	0.425	0.53	0.64	0.74	0.85	1.06	1.28	1.49	1.70
3/4	0.159	0.319	0.478	0.638	0.80	0.96	1.12	1.28	1.59	1.91	2.23	2.55
7/8	0.186	0.372	0.56	0.744	0.932	1.12	1.30	1.49	1.660	2.232	2.604	2.776
1	0.213	0.425	0.638	0.850	1.06	1.28	1.49	1.70	2.13	2.55	2.98	3.40
1 1/8	0.233	0.475	0.71	0.95	1.18	1.42	1.66	1.9	2.37	2.84	3.32	3.79
1 1/4	0.266	0.531	0.797	1.063	1.33	1.59	1.86	2.13	2.66	3.19	3.72	4.25
1 1/2	0.319	0.638	0.956	1.275	1.59	1.91	2.23	2.55	3.19	3.83	4.46	5.10
1 3/4	0.372	0.744	1.116	1.488	1.86	2.23	2.60	2.98	3.72	4.46	5.21	5.95
2	0.425	0.850	1.275	1.700	2.13	2.55	2.98	3.40	4.25	5.10	5.95	6.80
2 1/4	0.478	0.956	1.434	1.913	2.39	2.87	3.35	3.83	4.78	5.74	6.69	7.65
2 1/2	0.531	1.063	1.594	2.125	2.66	3.19	3.72	4.25	5.31	6.38	7.44	8.50
2 3/4	0.584	1.169	1.753	2.338	2.92	3.51	4.09	4.68	5.84	7.01	8.18	9.35

WEIGHTS OF FLAT ROLLED STEEL – *continued*

POUNDS PER LINEAL FOOT:

Width (Inches)	*Thickness (Inches)*											
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	*1*
3	0.638	1.275	1.913	2.550	3.19	3.83	4.46	5.10	6.38	7.65	8.93	10.20
3 1/4	0.691	1.381	2.072	2.763	3.45	4.14	4.83	5.53	6.91	8.29	9.67	11.05
3 1/2	0.744	1.488	2.231	2.975	3.72	4.46	5.21	5.95	7.44	8.93	10.41	11.90
3 3/4	0.797	1.594	2.391	3.188	3.98	4.78	5.58	6.38	7.97	9.56	11.16	12.75
4	0.850	1.700	2.500	3.400	4.25	5.10	5.95	6.80	8.50	10.20	11.90	13.60
4 1/4	0.903	1.806	2.709	3.613	4.52	5.42	6.32	7.23	9.03	10.84	12.64	14.45
4 1/2	0.956	1.913	2.860	3.825	4.78	5.74	6.69	7.65	9.56	11.48	13.39	15.30
4 3/4	1.009	2.019	3.028	4.038	5.05	6.06	7.07	8.08	10.09	12.11	14.13	16.15
5	1.063	2.125	3.188	4.250	5.31	6.38	7.44	8.50	10.63	12.75	14.88	17.00
5 1/4	1.116	2.231	3.347	4.463	5.58	6.69	7.81	8.93	11.16	13.39	15.62	17.85
5 1/2	1.169	2.338	3.506	4.675	5.84	7.01	8.18	9.35	11.69	14.03	16.36	18.70
5 3/4	1.222	2.444	3.666	4.888	6.11	7.33	8.55	9.78	12.22	14.66	17.11	19.55
6	1.275	2.550	3.825	5.100	6.38	7.65	8.93	10.20	12.75	15.30	17.85	20.40
7	1.487	2.975	4.463	5.95	7.44	8.93	10.41	11.90	14.88	17.85	20.83	23.80

WEIGHTS OF FLAT ROLLED STEEL – *continued*

POUNDS PER LINEAL FOOT:

Width (Inches)	*Thickness (Inches)*											
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
8	1.70	3.40	5.10	6.80	8.50	10.20	11.90	13.60	17.00	20.40	23.80	27.20
9	1.912	3.825	5.738	7.650	9.56	11.48	13.39	15.30	19.13	22.95	26.78	30.60
10	2.125	4.25	6.375	8.50	10.63	12.75	14.88	17.00	21.25	25.50	29.75	34.00
11	2.337	4.675	7.013	9.35	11.69	14.03	16.36	18.70	23.38	28.05	32.73	37.40
12	2.55	5.10	7.65	10.20	12.75	15.30	17.85	20.40	25.50	30.60	35.70	40.80
14	2.975	5.95	8.93	11.90	14.88	17.85	20.83	23.80	29.75	35.70	41.70	47.60
16	3.40	6.80	10.20	13.60	17.00	20.40	23.80	27.20	34.00	40.80	47.60	54.40
18	3.825	7.65	11.48	15.30	19.13	22.95	26.78	30.60	38.25	45.90	53.60	61.20

WEIGHTS OF JOISTS WITH 5^0 TAPER FLANGES:

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*
3 x 2	$4\frac{1}{2}$
4 x $2\frac{1}{2}$	$6\frac{1}{2}$
5 x 3	9
6 x $3\frac{1}{2}$	$11\frac{1}{2}$
7 x 4	$14\frac{1}{2}$
8 x 4	17

WEIGHTS OF RECTANGULAR HOLLOW SECTIONS:

B.S. 4: PART 2: 1963:

STEEL:

Serial Size (Inches)	*Thickness (S.W.G. or Inches)*	*Weight (Pounds Per Foot)*
2 x 1	12	1.88
	10	2.24
$2\frac{1}{2}$ x $1\frac{1}{2}$	10	3.11
	8	3.78
3 x $1\frac{1}{2}$	10	3.55
	8	4.32
3 x 2	10	3.98
	6	5.7
$3\frac{1}{2}$ x $1\frac{1}{2}$	10	3.98
	8	4.87
4 x 2	10	4.86
	8	5.96
4 x 3	9	6.39
	6	8.32
5 x 2	6	8.32
	$\frac{1}{4}$	10.5
5 x $2\frac{1}{2}$	$\frac{3}{16}$	9.02
	$\frac{1}{4}$	11.8
5 x 3	$\frac{3}{16}$	9.66
	$\frac{1}{4}$	12.6
6 x 3	$\frac{3}{16}$	10.9
	$\frac{1}{4}$	14.3
	$\frac{3}{8}$	20.8
6 x 4	$\frac{3}{16}$	12.2
	$\frac{1}{4}$	16.0
	$\frac{3}{8}$	23.3
8 x 4	$\frac{1}{4}$	19.4
	$\frac{3}{8}$	28.4
8 x 6	$\frac{1}{4}$	22.8
	$\frac{3}{8}$	33.5
10 x 6	$\frac{1}{4}$	26.2
	$\frac{3}{8}$	38.6
12 x 8	$\frac{1}{4}$	33.0
	$\frac{3}{8}$	48.8
	$\frac{1}{2}$	64.2

WEIGHTS OF ROLLED LONG STALK T-BARS: B.S. 4: PART 1: 1962: STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*
1 x 3	2.45
$1\frac{3}{4}$ x $4\frac{1}{2}$	5.00
$2\frac{1}{2}$ x 5	8.48
3 x 6	10.95
$3\frac{1}{2}$ x 7	13.74
4 x 8	16.81
5 x 10	23.80

WEIGHTS OF ROLLED SHORT STALK T-BARS:
B.S. 4: PART 1: 1962:
STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*
$1\frac{1}{2}$ x $1\frac{1}{2}$	2.36
2 x 2	3.21
$2\frac{1}{2}$ x $2\frac{1}{2}$	4.07
	5.92
3 x 3	7.20
4 x 3	8.49
	11.09
4 x 4	9.77
	12.79
5 x 3	9.79
	12.80
5 x 4	11.06
	14.50
6 x 3	11.08
	14.52
6 x 4	16.22
	19.99
6 x 6	19.62
	24.23

WEIGHTS OF ROLLED STEEL JOISTS:
MERCHANTS' CHARTS:

Size (Inches)	*Weight (Pounds Per Foot)*
3 x $2\frac{1}{8}$	5.7
4 x $1\frac{3}{4}$	5
4 x 3	10
5 x $2\frac{1}{2}$	9
6 x 3	12
6 x 5	25
7 x $3\frac{1}{2}$	15
8 x 4	18
8 x 6	35
9 x 4	21
9 x 7	50
10 x $4\frac{1}{2}$	25
10 x 6	40
10 x 8	55
10 x 8	70
12 x 5	30
12 x 6	54
12 x 8	65
13 x 5	35
14 x $5\frac{1}{2}$	40
15 x 6	45
16 x 6	50
16 x 8	75
18 x 6	55
20 x $6\frac{1}{2}$	65
22 x 7	75
24 x $7\frac{1}{2}$	90
24 x $7\frac{1}{2}$	95
24 x $7\frac{1}{2}$	100

WEIGHTS OF SQUARE HOLLOW SECTIONS:

B.S. 4: PART 2: 1963:

STEEL:

Serial Size (Inches)	*Thickness (S.W.G. or Inches)*	*Weight (Pounds Per Foot)*
1 x 1	12	1.17
	10	1.37
$1\frac{1}{2}$ x $1\frac{1}{2}$	12	1.88
	10	2.24
2 x 2	10	3.11
	6	4.40
$2\frac{1}{2}$ x $2\frac{1}{2}$	10	3.98
	6	5.70
3 x 3	10	4.86
	8	5.96
$3\frac{1}{2}$ x $3\frac{1}{2}$	9	6.39
	6	8.32
4 x 4	8	8.13
	6	9.62
	$\frac{1}{4}$	12.2
	$\frac{3}{8}$	18.2
$4\frac{1}{2}$ x $4\frac{1}{2}$	$\frac{3}{16}$	10.9
	$\frac{1}{4}$	14.3
	$\frac{3}{8}$	20.8
5 x 5	$\frac{3}{16}$	12.2
	$\frac{1}{4}$	16.0
	$\frac{3}{8}$	23.3
6 x 6	$\frac{1}{4}$	19.4
	$\frac{3}{8}$	28.4
7 x 7	$\frac{1}{4}$	22.8
	$\frac{3}{8}$	33.5
8 x 8	$\frac{1}{4}$	26.2
	$\frac{3}{8}$	38.6
10 x 10	$\frac{1}{4}$	33.0
	$\frac{3}{8}$	48.8
	$\frac{1}{2}$	64.2

WEIGHTS OF T-BARS (EQUAL):

MERCHANTS' CHARTS:

STEEL:

POUNDS PER FOOT

Size (Inches)	*Thickness (Inches)*						
	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$
1 x 1	1.17	-	-	-	-	-	-
$1\frac{1}{4}$ x $1\frac{1}{4}$	1.49	1.92	-	-	-	-	-
$1\frac{1}{2}$ x $1\frac{1}{2}$	1.81	2.36	2.86	-	-	-	-
$1\frac{3}{4}$ x $1\frac{3}{4}$	2.10	2.79	3.36	3.97	-	-	-
2 x 2	-	3.21	3.94	4.64	6.05	-	-
$2\frac{1}{2}$ x $2\frac{1}{2}$	-	4.07	5.00	5.92	7.67	9.42	-
3 x 3		4.90	6.05	7.20	9.38	11.43	13.39
4 x 4	-	6.65	8.21	9.78	12.79	15.73	18.54
6 x 6	-	-	-	-	19.62	24.23	28.73

WEIGHTS OF T-BARS (UNEQUAL) – *continued*

MERCHANTS' CHARTS:

STEEL:

POUNDS PER FOOT

Size (Inches)	*Thickness (Inches)*					
	1/4	5/16	3/8	1/2	5/8	3/4
1 1/2 x 1 1/4	2.11	–	–	–	–	–
1 3/4 x 1 1/2	2.55	–	–	–	–	–
2 x 1 1/4	2.73	3.31	3.83	–	–	–
2 x 1 1/2	2.77	3.39	3.99	–	–	–
2 x 1 3/4	2.97	3.79	4.59	–	–	–
2 1/4 x 2	3.40	4.17	4.94	–	–	–
2 1/2 x 2	3.62	4.45	5.32	–	–	–
3 x 2 1/2	4.46	5.52	6.54	8.52	10.36	12.12
3 1/2 x 2 1/2	4.89	6.04	7.17	9.35	11.42	13.39
4 x 3	5.74	7.11	8.49	11.09	13.55	15.94
5 x 3	6.59	8.17	9.79	12.80	15.67	18.49
5 x 4	7.44	9.23	11.08	14.50	17.84	21.04
6 x 3	7.44	9.23	11.08	14.50	17.84	21.04
6 x 4	–	10.29	12.27	16.22	19.99	23.59

WEIGHTS OF T-BARS CUT FROM UNIVERSAL BEAMS:

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Nominal Size (Inches)*
$5\frac{1}{4}$ x 4	8.5	$5\frac{1}{4}$ x $4\frac{1}{16}$
$5\frac{1}{4}$ x 4	10.0	$5\frac{1}{4}$ x $4\frac{1}{16}$
$5\frac{3}{4}$ x 5	10.5	$5\frac{3}{4}$ x $4\frac{15}{16}$
$5\frac{3}{4}$ x 5	12.5	$5\frac{3}{4}$ x $5\frac{1}{16}$
$5\frac{3}{4}$ x 5	14.5	$5\frac{13}{16}$ x $5\frac{1}{8}$
5 x 6	12.5	$4\frac{7}{8}$ x 6
5 x 6	14.0	$4\frac{7}{8}$ x $6\frac{1}{16}$
5 x 6	16.0	$4\frac{15}{16}$ x $6\frac{1}{8}$
$6\frac{1}{2}$ x 6	13.5	$6\frac{1}{2}$ x 6
$6\frac{1}{2}$ x 6	15.5	$6\frac{1}{2}$ x $6\frac{1}{16}$
$6\frac{1}{2}$ x 6	18.0	$6\frac{9}{16}$ x $6\frac{1}{8}$
$6\frac{3}{4}$ x 7	15.0	$6\frac{3}{4}$ x $6\frac{15}{16}$
$6\frac{3}{4}$ x 7	17.0	$6\frac{3}{4}$ x 7
$6\frac{3}{4}$ x 7	19.0	$6\frac{3}{4}$ x $7\frac{1}{16}$
$6\frac{3}{4}$ x 7	22.5	$6\frac{13}{16}$ x $7\frac{3}{16}$
6 x $7\frac{1}{2}$	17.5	6 x $7\frac{1}{2}$
6 x $7\frac{1}{2}$	20.0	$6\frac{1}{16}$ x $7\frac{9}{16}$
6 x $7\frac{1}{2}$	22.5	$6\frac{1}{16}$ x $7\frac{5}{8}$
6 x 8	20.0	6 x 8
6 x 8	22.5	6 x $8\frac{1}{8}$
6 x 8	25.0	$6\frac{1}{16}$ x $8\frac{3}{16}$
7 x 8	18.0	7 x $7\frac{15}{16}$
7 x 8	20.0	7 x 8
7 x 8	22.5	$7\frac{1}{16}$ x $8\frac{1}{16}$
7 x 8	25.0	$7\frac{1}{16}$ x $8\frac{1}{8}$
6 x 9	22.5	6 x 9
6 x 9	25.0	6 x $9\frac{1}{16}$
6 x 9	27.5	$6\frac{1}{16}$ x $9\frac{1}{8}$
$7\frac{1}{2}$ x 9	25.0	$7\frac{1}{2}$ x 9
$7\frac{1}{2}$ x 9	27.5	$7\frac{9}{16}$ x $9\frac{1}{16}$
$7\frac{1}{2}$ x 9	30.0	$7\frac{9}{16}$ x $9\frac{1}{8}$

WEIGHTS OF T-BARS CUT FROM UNIVERSAL BEAMS – *continued*

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Nominal Size (Inches)*
$7\frac{1}{2}$ x 9	33.0	$7\frac{9}{16}$ x $9\frac{3}{16}$
$8\frac{1}{4}$ x $10\frac{1}{2}$	31.0	$8\frac{1}{4}$ x $10\frac{1}{2}$
$8\frac{1}{4}$ x $10\frac{1}{2}$	34.0	$8\frac{1}{4}$ x $10\frac{9}{16}$
$8\frac{1}{4}$ x $10\frac{1}{2}$	36.5	$8\frac{5}{16}$ x $10\frac{5}{8}$
$8\frac{1}{4}$ x $10\frac{1}{2}$	41.0	$8\frac{5}{16}$ x $10\frac{3}{4}$
9 x 12	38.0	9 x $11\frac{15}{16}$
9 x 12	42.0	9 x $12\frac{1}{16}$
9 x 12	47.0	$9\frac{1}{16}$ x $12\frac{1}{8}$
10 x $13\frac{1}{2}$	47.0	10 x $13\frac{7}{16}$
10 x $13\frac{1}{2}$	51.0	10 x $13\frac{9}{16}$
10 x $13\frac{1}{2}$	57.0	$10\frac{1}{16}$ x $13\frac{5}{8}$
$10\frac{1}{2}$ x 15	58.0	$10\frac{1}{2}$ x 15
$10\frac{1}{2}$ x 15	66.0	$10\frac{9}{16}$ x $15\frac{1}{8}$
$11\frac{1}{2}$ x $16\frac{1}{2}$	65.0	$11\frac{1}{2}$ x $16\frac{9}{16}$
$11\frac{1}{2}$ x $16\frac{1}{2}$	76.0	$11\frac{9}{16}$ x $16\frac{3}{4}$
12 x 12	50.0	12 x 12
12 x 12	60.0	$12\frac{1}{16}$ x $12\frac{1}{8}$
12 x 12	80.0	$12\frac{1}{4}$ x $12\frac{7}{16}$
12 x 18	75.0	12 x $17\frac{15}{16}$
12 x 18	85.0	12 x $18\frac{1}{16}$
13 x $10\frac{1}{2}$	56.0	13 x $10\frac{1}{2}$
13 x $10\frac{1}{2}$	63.5	$13\frac{1}{16}$ x $10\frac{5}{8}$
13 x $10\frac{1}{2}$	71.0	$13\frac{1}{8}$ x $10\frac{3}{4}$

WEIGHTS OF T-BARS CUT FROM UNIVERSAL COLUMNS:

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Nominal Size (Inches)*
6 x 3	7.85	6 x 3
6 x 3	10.0	6 x 3 1/8
6 x 3	12.5	6 1/16 x 3 3/16
8 x 4	15.5	8 x 4
8 x 4	17.5	8 x 4 1/16
8 x 4	20.0	8 1/16 x 4 1/8
8 x 4	24.0	8 1/8 x 4 1/4
8 x 4	29.0	8 1/4 x 4 3/8
10 x 5	24.5	10 x 5
10 x 5	30.0	10 1/16 x 5 1/8
10 x 5	36.0	10 3/16 x 5 1/4
10 x 5	44.5	10 1/4 x 5 7/16
12 x 6	32.5	12 x 6 1/16
12 x 6	39.5	12 1/16 x 6 3/16
12 x 6	46.0	12 1/8 x 6 5/16
12 x 6	53.0	12 1/4 x 6 7/16
14 1/2 x 7	43.5	14 1/2 x 7
14 1/2 x 7	51.5	14 9/16 x 7 1/8
14 1/2 x 7	59.5	14 5/8 x 7 1/4
14 1/2 x 7	68.0	14 3/4 x 7 3/8
16 x 7	79.0	15 9/16 x 7 1/2

WEIGHTS OF UNIVERSAL BEAMS:

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Nominal Size (Inches)*
8 x $5\frac{1}{4}$	17	8 x $5\frac{1}{4}$
	20	$8\frac{1}{8}$ x $5\frac{1}{4}$
10 x $5\frac{3}{4}$	21	$9\frac{7}{8}$ x $5\frac{3}{4}$
	25	$10\frac{1}{16}$ x $5\frac{3}{4}$
	29	$10\frac{1}{4}$ x $5\frac{3}{16}$
12 x 5	25	12 x $4\frac{7}{8}$
	28	$12\frac{1}{16}$ x $4\frac{7}{8}$
	32	$12\frac{1}{4}$ x $4\frac{15}{16}$
12 x $6\frac{1}{2}$	27	$11\frac{15}{16}$ x $6\frac{1}{2}$
	31	$12\frac{1}{16}$ x $6\frac{1}{2}$
	36	$12\frac{1}{4}$ x $6\frac{9}{16}$
14 x $6\frac{3}{4}$	30	$13\frac{7}{8}$ x $6\frac{3}{4}$
	34	14 x $6\frac{3}{4}$
	38	$14\frac{1}{8}$ x $6\frac{3}{4}$
	45	$14\frac{5}{16}$ x $6\frac{13}{16}$
15 x 6	35	15 x 6
	40	$15\frac{1}{8}$ x 6
	45	$15\frac{5}{16}$ x $6\frac{1}{16}$
16 x 6	40	$16\frac{1}{16}$ x 6
	45	$16\frac{1}{4}$ x 6
	50	$16\frac{3}{8}$ x $6\frac{1}{16}$
16 x 7	36	$15\frac{7}{8}$ x 7
	40	16 x 7
	45	$16\frac{1}{8}$ x $7\frac{1}{16}$
	50	$16\frac{1}{4}$ x $7\frac{1}{16}$
18 x 6	45	18 x 6
	50	$18\frac{3}{16}$ x 6
	55	$18\frac{5}{16}$ x $6\frac{1}{16}$
18 x $7\frac{1}{2}$	50	18 x $7\frac{1}{2}$
	55	$18\frac{1}{8}$ x $7\frac{9}{16}$
	60	$18\frac{1}{4}$ x $7\frac{9}{16}$
	66	$18\frac{3}{8}$ x $7\frac{9}{16}$
21 x $8\frac{1}{4}$	62	21 x $8\frac{1}{4}$
	68	$21\frac{1}{8}$ x $8\frac{1}{4}$
	73	$21\frac{1}{4}$ x $8\frac{5}{16}$
	82	$21\frac{7}{16}$ x $8\frac{5}{16}$

WEIGHTS OF UNIVERSAL BEAMS – *continued*

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Nominal Size (Inches)*
21 x 13	112	21 x 13
	127	21 1/4 x 13 1/16
	142	21 7/16 x 13 1/8
24 x 9	76	23 15/16 x 9
	84	24 1/16 x 9
	94	24 5/16 x 9 1/16
24 x 12	100	24 x 12
	120	24 5/16 x 12 1/16
	160	24 15/16 x 12 1/4
27 x 10	94	26 15/16 x 10
	102	27 1/16 x 10
	114	27 1/4 x 10 1/16
30 x 10 1/2	116	30 x 10 1/2
	132	30 5/16 x 10 9/16
33 x 11 1/2	130	33 1/8 x 11 1/2
	152	33 1/2 x 11 9/16
36 x 12	150	35 13/16 x 12
	170	36 3/16 x 12
	194	36 1/2 x 12 1/8
36 x 16 1/2	230	35 7/8 x 16 1/2
	260	36 1/4 x 16 9/16

WEIGHTS OF UNIVERSAL BEARING PILES:

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Width of Section (Inches)*
8 x 8	36	8.158
10 x 10	42	10.078
	57	10.224
12 x 12	53	12.046
	74	12.217
14 x 14½	73	14.586
	89	14.696
	102	14.784
	117	14.885

WEIGHTS OF UNIVERSAL COLUMNS:

B.S. 4: PART 1: 1962:

STEEL:

Serial Size (Inches)	*Weight (Pounds Per Foot)*	*Nominal Size (Inches)*
6 x 6	15.7	6 x 6
	20	$6\frac{3}{16}$ x 6
	25	$6\frac{3}{8}$ x $6\frac{1}{16}$
8 x 8	31	8 x 8
	35	$8\frac{1}{8}$ x 8
	40	$8\frac{1}{4}$ x $8\frac{1}{16}$
	48	$8\frac{1}{2}$ x $8\frac{1}{8}$
	58	$8\frac{3}{4}$ x $8\frac{1}{4}$
10 x 10	49	10 x 10
	60	$10\frac{1}{4}$ x $10\frac{1}{16}$
	72	$10\frac{1}{2}$ x $10\frac{3}{16}$
	89	$10\frac{7}{8}$ x $10\frac{1}{4}$
	112	$11\frac{3}{8}$ x $10\frac{7}{16}$
12 x 12	65	$12\frac{1}{8}$ x 12
	79	$12\frac{3}{8}$ x $12\frac{1}{16}$
	92	$12\frac{3}{8}$ x $12\frac{1}{8}$
	106	$12\frac{7}{8}$ x $12\frac{1}{4}$
	133	$13\frac{3}{8}$ x $12\frac{3}{8}$
	161	$13\frac{7}{8}$ x $12\frac{1}{2}$
	190	$14\frac{3}{8}$ x $12\frac{11}{16}$
14 x $14\frac{1}{2}$	87	14 x $14\frac{1}{2}$
	103	$14\frac{1}{4}$ x $14\frac{9}{16}$
	119	$14\frac{1}{2}$ x $14\frac{5}{8}$
	136	$14\frac{3}{4}$ x $14\frac{3}{4}$
Column core	320	$16\frac{13}{16}$ x $16\frac{11}{16}$
14 x 16	158	15 x $15\frac{9}{16}$
	193	$15\frac{1}{2}$ x $15\frac{11}{16}$
	228	16 x $15\frac{7}{8}$
	264	$16\frac{1}{2}$ x 16
	314	$17\frac{5}{16}$ x $16\frac{1}{4}$
	370	18 x $16\frac{1}{2}$
	426	$18\frac{11}{16}$ x $16\frac{11}{16}$

TIMBER AND TIMBER CONSTRUCTION:

DEPTH OF LINTELS:

Width of Opening	*Minimum Depth of Lintels*	
	Solid (Inches)	*Built-up (Inches)*
Not exceeding 4 feet 6 inches	3	6
Over 4 feet 6 inches, but not exceeding 6 feet	4	6
Over 6 feet, but not exceeding 7 feet 6 inches	5	8
Over 7 feet 6 inches, but not exceeding 9 feet	6	8

OBTAINABLE SIZES OF TIMBER:

Nominal Size (Inches)	*Dressed Size (Inches)*	*Gauged Size (Sawn) (Inches)*	*Thickness or Nominal Width (Inches)*											
			1	*1¼*	*1½*	*2*	*3*	*4*	*5*	*6*	*8*	*9*	*10*	*12*
1	¾	–	–	–	–	–	*	*	*	*	*	*	*	*
1¼	1	1¼	–	–	–	–	*	*	*	*	*	*	*	*
1½	1¼	1⅜	–	–	–	–	*	*	*	*	*	*	*	*
2	1¾	1⅞	–	–	–	*	*	*	*	*	*	*	*	*
3	2⅝	2⅞	–	*	*	*	–	*	*	*	*	*	*	*
4	3⅝	3⅞	*	*	*	*	*	*	*	*	*	*	*	*
5	4⅝	4⅞	*	*	*	*	*	*	*	*	*	*	*	*
6	5⅝	5⅞	*	*	*	*	*	*	*	*	*	*	*	*
8	7½	7¾	*	*	*	*	*	*	*	*	–	–	–	–
9	8½	8¾	*	*	*	*	*	*	*	*	–	–	–	–
10	9½	9¾	*	*	*	*	*	*	*	*	–	–	–	–
12	11½	11¾	*	*	*	*	*	*	*	*	–	–	–	–

Notes: * Denotes available sizes.

To reduce to board measure, use nominal sizes.

SPAN OF FLOOR JOISTS:

Size of Joist (Inches)	*Maximum Span*	
	Class (a); Live Load of 40 Pounds Per Square Foot	*Class (b); Live Load of 60 Pounds Per Square Foot*
4 x 2	5'6"	5'0"
5 x 2	7'0"	6'6"
6 x 2	9'0"	8'0"
7 x 2	10'6"	9'6"
8 x 2	12'0"	10'6"
9 x 2	13'6"	12'0"
10 x 2	15'0"	13'6"
12 x 2	19'0"	17'0"

SPAN OF RAFTERS:

Roof Covering	*Minimum Support for Roofing Material (Inches)*	*Maximum Spacing of Rafters Centre to Centre (Inches)*	*Span of Rafters (Inches)*								
			3 x 2	*4 x 2*	*5 x 2*	*6 x 2*	*7 x 2*	*8 x 2*	*9 x 2*	*10 x 2*	*12 x 2*
(1) PITCHED ROOFS –											
Tiles or slates	2 x 1 (battens)	18	–	8'0"	10'0"	12'0"	–	–	–	–	–
Corrugated sheets of iron or asbestos and fabric or sheet metal	1 (sarking)	20	6'0"	8'6"	10'6"	13'0"	–	–	–	–	–
Corrugated sheets of iron or asbestos	3 x 2 (purlins)	36	5'0"	7'0"	8'6"	10'0"	–	–	–	–	–
(2) FLAT ROOFS WITHOUT ACCESS –											
Corrugated sheets of iron or asbestos and fabric or sheet metal	1 (sarking)	20	5'6"	7'6"	9'6"	11'0"	13'6"	15'6"	–	–	–
Corrugated sheets of iron or asbestos	3 x 2 (purlins)	36	–	6'0"	7'9"	9'3"	10'9"	12'3"	–	–	–
(3) FLAT ROOFS WITH ACCESS –											
Fabric or sheet metal	1 (sarking)	18	–	6'0"	7'9"	9'3"	10'9"	12'3"	14'0"	15'6"	19'0"
(4) PITCHED OR FLAT ROOFS WITHOUT ACCESS (OUTBUILDINGS ONLY) –											
Corrugated sheets of iron or asbestos and fabric or sheet metal	1 (sarking)	20	6'0"	9'0"	12'0"	14'0"	–	–	–	–	–
Corrugated sheets of iron or asbestos	3 x 2 (purlins)	36	5'0"	8'0"	10'0"	12'0"	–	–	–	–	–

Notes: Section (4) shall apply only to outhouses not exceeding 10 feet in height or 200 square feet in base area. Outhouses roofed with tiles or slates or with a flat roof with access shall comply with the requirements of sections (1) and (3).

WEIGHTS OF MATERIALS:

BUILDING MATERIALS:

Material or Component	Nominal Size or Thickness (Inches)	Weight	
		Pounds	Per
ALUMINIUM –			
Wrought alloys, B.S.1161	–	0.095 to 0.104	Cubic inch
		164 to 179	Cubic foot
Cast alloys	–	0.097 to 0.108	Cubic inch
		167 to 187	Cubic foot
ASBESTOS –			
Felt	1	0.75	Square foot
Fibres, sprayed	1	1.0	Square foot
ASBESTOS CEMENT SHEETING –			
Corrugated B.S.690 – Corrugations $2\frac{7}{8}$ inch pitch	–	3.09	Square foot
Corrugations $5\frac{3}{4}$ inch pitch	–	3.11	Square foot
2 inch corrugations, 15 inch pitch	–	3.04	Square foot
Flat, B.S.690 – Semi-compressed ..	$\frac{1}{4}$	2.33	Square foot
Fully compressed ..	$\frac{1}{4}$	2.45	Square foot
Wallboard	$\frac{1}{4}$	1.44	Square foot

BUILDING MATERIALS – *continued*

Material or Component	*Nominal Size or Thickness (Inches)*	*Weight*	
		Pound	*Per*
ASPHALT –			
Damp-proofing B.S.1097	1	11.0	Square foot
Roads and footpaths, B.S.594, 596 and 1152 ..	1	11.7 to 11.9	Square foot
Roofing B.S.988 and 1162	1	11.4	Square foot
Note: All weights are 'as laid'.			
BOARDS –			
Corkboard	1	0.875	Square foot
Compressed corkboard	1	1.5	Square foot
Fibre building boards, B.S.1142 – Insulating board	$\frac{1}{2}$	0.75	Square foot
Medium hardboard	$\frac{1}{4}$	0.85	Square foot
Hardboard	$\frac{1}{8}$	0.65	Square foot
Super hardboard	$\frac{1}{8}$	0.70	Square foot
Gypsum plasterboard	$\frac{1}{4}$	0.9 to 1.6	Square foot
Strawboard building slab .. Approximately	–	13.6 (approx.)	Cubic foot
Perlite	$\frac{1}{2}$	1.9	Cubic foot

BUILDING MATERIALS – *continued*

Material or Component	*Nominal Size or Thickness (Inches)*	*Weight*	
		Pounds	*Per*
BRASS –			
Zinc 40 per cent, copper 60 per cent ..	–	0.30	Cubic inch
		524	Cubic foot
Zinc 30 per cent, copper 70 per cent ..	–	0.31	Cubic inch
		531	Cubic foot
BRICKS –			
Glass blocks, hollow, B.S.1207	$3\frac{7}{8}$	17.5	Square foot
BRICKWORK –			
Bricks of low density (up to 110 pounds/cubic foot) including London stocks, Flettons, Birmingham wire cuts, sand-lime and other light porous bricks – Dry	–	114	Cubic foot
Saturated	–	127	Cubic foot
Bricks of medium density (110 to 135 pounds/cubic foot) including the denser types of common bricks and facing bricks but excluding engineering bricks – Dry	–	134	Cubic foot
Saturated	–	140	Cubic foot

BUILDING MATERIALS – *continued*

Material or Component	*Nominal Size or Thickness (Inches)*	*Weight*	
		Pounds	*Per*
BRONZE –			
Gunmetal, cast, B.S.382, 383, 898, 1022 and 1024	–	0.304 to 0.320	Cubic inch
		525 to 550	Cubic foot
Phosphor bronze, wrought, 3.5 to 7.0 per cent tin, B.S.369 and 407	–	0.320 to 0.321	Cubic inch
		550 to 555	Cubic foot
CONCRETE –			
No-fines, with heavy aggregate	–	100 to 120	Cubic foot
No-fines, with light aggregate	–	55 to 80	Cubic foot
Pumice	–	35 to 70	Cubic foot
Sand and gravel, or crushed natural stone, B.S.882	–	140 to 150	Cubic foot
Reinforced, with sand and gravel or crushed natural stone aggregate – with 1 per cent steel ..	–	144 to 154	Cubic foot
with 2 per cent steel ..	–	148 to 158	Cubic foot
with 5 per cent steel ..	–	160 to 170	Cubic foot
with 10 per cent steel ..	–	180 to 190	Cubic foot
Note: The B.S. numbers relate to the aggregates used.			

BUILDING MATERIALS – *continued*

Material or Component		*Nominal Size or Thickness (Inches)*	*Weight*	
			Pounds	*Per*
COPPER –				
Cast, B.S.143		–	0.315	Cubic inch
			545	Cubic foot
Wrought, B.S.899		–	0.323	Cubic inch
			558	Cubic foot
Sheet and strip, B.S.899 and 1110 ..	S.W.G.	18	2.232	Square foot
	S.W.G.	20	1.674	Square foot
	S.W.G.	22	1.302	Square foot
	S.W.G.	24	1.023	Square foot
		$\frac{1}{100}$	0.465	Square foot
FLOORING –				
Linoleum, B.S.810		$\frac{1}{8}$	0.51 to 1.16	Square foot
Rubber		$\frac{1}{16}$	1.0 to 1.3	Square foot
		$\frac{1}{8}$	1.45 to 1.95	Square foot
		$\frac{1}{4}$	1.95 to 2.7	Square foot
		$\frac{3}{16}$	2.92 to 3.9	Square foot
		$\frac{1}{2}$	3.9 to 5.2	Square foot

BUILDING MATERIALS – *continued*

Material or Component		*Nominal Size or Thickness (Inches)*	*Weight*	
			Pounds	*Per*
LEAD –				
Sheet, B.S.1178		0.017	1.0	Square foot
		0.025	1.5	Square foot
		0.033	2.0	Square foot
PLASTERBOARD –				
B.S.1230		1/4	0.9 to 1.6	Square foot
		3/8	1.3 to 2.5	Square foot
		1/2	1.8 to 3.3	Square foot
		3/4	2.7 to 5.1	Square foot
PLYWOOD –				
Hardwoods (other than Gaboon)	Per m/m	–	0.15	Square foot
Douglas fir	Per m/m	–	0.125	Square foot
Gaboon	Per m/m	–	0.10	Square foot
PLYWOOD, METAL-FACED –				
Aluminium –	1 sided	3/16	0.75	Square foot
	2 sided	3/16	1.06	Square foot
	1 sided	1/4	1.0	Square foot
	2 sided	1/4	1.25	Square foot

Material or Component		*Nominal Size or Thickness (Inches)*	*Weight*	
			Pounds	*Per*
PLYWOOD, METAL-FACED – *continued*				
Aluminium –	1 sided	3/16	1.25	Square foot
	2 sided	3/16	1.5	Square foot
	1 sided	1/2	1.70	Square foot
	2 sided	1/2	2.0	Square foot
	1 sided	3/4	2.5	Square foot
	2 sided	3/4	2.8	Square foot
Galvanised steel –	1 sided	3/16	1.0	Square foot
	2 sided	3/16	1.63	Square foot
	1 sided	1/4	1.25	Square foot
	2 sided	1/4	1.75	Square foot
	1 sided	3/16	1.5	Square foot
	2 sided	3/16	2.0	Square foot
	1 sided	1/2	1.9	Square foot
	2 sided	1/2	2.5	Square foot
	1 sided	3/4	2.75	Square foot
	2 sided	3/4	3.28	Square foot

BUILDING MATERIALS – *continued*

Material or Component		*Nominal Size or Thickness (Inches)*	*Weight*	
			Pounds	*Per*
STEEL, SHEET –				
Black plate		$\frac{1}{100}$	0.408	Square foot
Galvanised sheet (3 inch corrugations) ..	B.G.	16	2.87	Square foot
	B.G.	18	2.27	Square foot
	B.G.	20	1.80	Square foot
	B.G.	22	1.43	Square foot
	B.G.	24	1.14	Square foot
	B.G.	26	0.90	Square foot
	B.G.	28	0.72	Square foot
	B.G.	30	0.57	Square foot
	B.G.	32	0.45	Square foot
Flat	B.G.	16	2.55	Square foot
	B.G.	18	2.02	Square foot
	B.G.	20	1.60	Square foot
	B.G.	22	1.28	Square foot
	B.G.	24	1.01	Square foot
	B.G.	26	0.80	Square foot
	B.G.	28	0.64	Square foot
	B.G.	30	0.50	Square foot
	B.G.	32	0.40	Square foot

BUILDING MATERIALS – *continued*

Material or Component	*Nominal Size or Thickness (Inches)*	*Weight*	
		Pounds	*Per*
TERRAZZO –			
Partitions, cast	$1\frac{1}{2}$	17.5 to 19.0	Square foot
Pavings	$\frac{5}{8}$	6.5 to 7.2	Square foot
Tiles, pre-cast	1	10.5 to 11.7	Square foot
TILING –			
Clay roof, B.S.402 – Handmade – $10\frac{1}{2}$ x $6\frac{1}{2}$ inches –			
$3\frac{3}{4}$ inch gauge	–	13.2 to 17.4	Square foot
4 inch gauge	–	12.3 to 16.5	Square foot
Machine-made – $3\frac{3}{4}$ inch gauge	–	11.7 to 16.2	Square foot
4 inch gauge	–	11.0 to 16.1	Square foot
Marseilles	–	6.5	Square foot
Note: All weights are 'as laid' but exclude battens.			

BUILDING MATERIALS – *continued*

TIMBER –

General Requirements:

A light to medium weight timber is preferred to a heavy timber for most parts of buildings. The preference arises partly from the handling and seasoning angles, and partly from consideration of sawing, machining, nailing and finishing.

In New Zealand the early settlers soon discovered that the native softwoods were admirable substitutes for Baltic pine, whereas in Australia the early settlers deferred the use of their abundant hardwoods while they could obtain softwoods from native or overseas sources.

Average air dry figures (at 12 per cent moisture content) for timbers used in New Zealand are:

Grown in New Zealand	*Weight Cubic Foot (Pounds)*
Rimu	37
Matai	38
Totara	30
Insignis pine	28 to 31
Miro	36
Kahikatea	29
Tawa	46
Red beech	44
European larch ..	35
Douglas fir	27 to 36
Corsican pine	31
Silver beech (Southland) ..	34
Silver beech (North Island)	46
Hard beech	48
Kauri	36
Tanekaha	42
Macrocarpa	31
Pukatea	30
Taraire	42
Mangeao	39
Kaikawaka	27
Hinau	45
Puriri	62
Silver pine	39

TIMBER – *continued*

IMPORTED:

Timber	*Weight per Cubic Foot (Pounds)*
Douglas fir	34 – 37
Redwood	27
Western red cedar	22
Baltic pine	30
Parana pine	29
Alerce	28
Keruing	49
Jarrah	53
Karri	58
Lignun vitae	78

NAILS:

APPROXIMATE NUMBER PER POUND:

Size (Inches x Gauge)	*Number (Per Pound)*
1 x 16	1080
1 x 15	840
1 x 14	723
1½ x 14	460
1½ x 13	340
1½ x 12	240
1½ x 11	206
2 x 14	280
2 x 13	230
2 x 12	190
2 x 11	158
2 x 10	120
2 x 9	100
2½ x 13	200
2½ x 12	150
2½ x 11	130
2½ x 10	100
2½ x 9	80
2½ x 8	65
3 x 10	81
3 x 9	67
3 x 8	60
3 x 7	48
3 x 6	39
3½ x 8	44
3½ x 7	40
4 x 7	35
4 x 6	30
5 x 5	21
6 x 4	13

WEIGHTS OF METALS:

CUBIC FOOTAGE WEIGHTS:

POUNDS:

Metal	*Weight*
Aluminium	167
Bell metal	502
Brass (cast)	519
Copper (cast)	537
Copper (sheet)	550
Gold	1200
Gun metal	528
Iron (cast)	450
Iron (wrought)	480
Lead (cast)	707
Lead (milled)	708
Mercury	852
Nickel	548
Platinum	1341
Silver	655
Steel	490
Tin	456
Zinc (sheet)	445

DRAWN COPPER BARS:

POUNDS PER LINEAR FOOT:

Size (Inches)	*Weight (Pounds)*
1/16 x 1/2	0.1206
1/16 x 5/8	0.1507
1/16 x 3/4	0.1809
1/16 x 7/8	0.2110
1/16 x 1	0.2412
1/16 x 1 1/4	0.3014
1/16 x 1 1/2	0.3617
1/8 x 1/2	0.2412
1/8 x 5/8	0.3014
1/8 x 3/4	0.3617
1/8 x 7/8	0.4220
1/8 x 1	0.4823
1/8 x 1 1/4	0.6029
1/8 x 1 1/2	0.7235
1/8 x 1 3/4	0.8440
1/8 x 2	0.9646
1/8 x 2 1/4	1.085
1/8 x 2 1/2	1.206
1/8 x 2 3/4	1.326
1/8 x 3	1.447
3/16 x 1/2	0.3617
3/16 x 5/8	0.4522
3/16 x 3/4	0.5426
3/16 x 7/8	0.6330
3/16 x 1	0.7235
3/16 x 1 1/4	0.9043
3/16 x 1 1/2	1.085
3/16 x 1 3/4	1.266
3/16 x 2	1.447
3/16 x 2 1/4	1.628
3/16 x 2 1/2	1.809
3/16 x 2 3/4	1.989
3/16 x 3	2.170

DRAWN COPPER BARS – *continued*

POUNDS PER LINEAR FOOT:

Size (Inches)	*Weight (Pounds)*
1/4 x 1/2	0.4823
1/4 x 5/8	0.6029
1/4 x 3/4	0.7235
1/4 x 7/8	0.8440
1/4 x 1	0.9646
1/4 x 1 1/4	1.206
1/4 x 1 1/2	1.447
1/4 x 1 3/4	1.688
1/4 x 2	1.929
1/4 x 2 1/4	2.170
1/4 x 2 1/2	2.412
1/4 x 2 3/4	2.653
1/4 x 3	2.894
5/16 x 1	1.447
5/16 x 1 1/4	1.809
5/16 x 1 1/2	2.170
5/16 x 1 3/4	2.532
5/16 x 2	2.894
5/16 x 2 1/4	3.256
5/16 x 2 1/2	3.617
5/16 x 2 3/4	3.979
5/16 x 3	4.341
5/16 x 3 1/4	4.702
5/16 x 3 1/2	5.064
5/16 x 3 3/4	5.426
5/16 x 4	5.788
5/16 x 4 1/4	6.149
5/16 x 4 1/2	6.511
5/16 x 4 3/4	6.873
5/16 x 5	7.235
1/2 x 1	1.929
1/2 x 1 1/4	2.412
1/2 x 1 1/2	2.894
1/2 x 1 3/4	3.376
1/2 x 2	3.858
1/2 x 2 1/4	4.341
1/2 x 2 1/2	4.823
1/2 x 2 3/4	5.305

DRAWN COPPER BARS:- *continued*

POUNDS PER LINEAR FOOT:

Size (Inches)	*Weight (Pounds)*
1/2 x 3	5.788
1/2 x 3 1/4	6.270
1/2 x 3 1/2	6.752
1/2 x 3 3/4	7.235
1/2 x 4	7.717
1/2 x 4 1/4	8.199
1/2 x 4 1/2	8.681
1/2 x 4 3/4	9.164
1/2 x 5	9.646
1/2 x 5 1/4	10.13
1/2 x 5 1/2	10.61
1/2 x 5 3/4	11.09
1/2 x 6	11.58
3/4 x 1	2.894
3/4 x 1 1/4	3.617
3/4 x 1 1/2	4.341
3/4 x 1 3/4	5.064
3/4 x 2	5.788
3/4 x 2 1/4	6.511
3/4 x 2 1/2	7.235
3/4 x 2 3/4	7.958
3/4 x 3	8.681
3/4 x 3 1/4	9.405
3/4 x 3 1/2	10.13
3/4 x 3 3/4	10.85
3/4 x 4	11.58
3/4 x 4 1/4	12.30
3/4 x 4 1/2	13.02
3/4 x 4 3/4	13.75
3/4 x 5	14.47
3/4 x 5 1/4	15.19
3/4 x 5 1/2	15.92
3/4 x 5 3/4	16.64
3/4 x 6	17.36

DRAWN COPPER BARS – *continued*

POUNDS PER LINEAR FOOT:

Size (Inches)	*Weight (Pounds)*
1 x 1	3.858
1 x 1 1/4	4.823
1 x 1 1/2	5.788
1 x 1 3/4	6.752
1 x 2	7.717
1 x 2 1/4	8.681
1 x 2 1/2	9.646
1 x 2 3/4	10.61
1 x 3	11.58
1 x 3 1/4	12.54
1 x 3 1/2	13.50
1 x 3 3/4	14.47
1 x 4	15.43
1 x 4 1/4	16.40
1 x 4 1/2	17.36
1 x 4 3/4	18.33
1 x 5	18.29
1 x 5 1/4	20.26
1 x 5 1/2	21.22
1 x 5 3/4	22.19
1 x 6	23.15

SQUARE FOOTAGE WEIGHTS:

POUNDS:

Thickness (Inches)	*Wrought Iron*	*Cast Iron*	*Steel*	*Copper*	*Tin*	*Zinc*	*Brass*	*Gun Metal*	*Lead*
1/16	2.50	2.34	2.55	2.89	2.41	2.28	2.63	2.73	3.71
1/8	5.00	4.69	5.10	5.79	4.81	4.55	5.26	5.46	7.41
3/16	7.50	7.03	7.65	8.68	7.22	6.83	7.89	8.19	11.1
1/4	10.0	9.38	10.2	11.6	9.63	9.10	10.5	10.9	14.8
5/16	12.5	11.7	12.8	14.5	12.0	11.4	13.2	13.7	18.5
3/8	15.0	14.1	15.3	17.4	14.4	13.7	15.8	16.4	22.2
7/16	17.5	16.4	17.9	20.3	16.8	15.9	18.4	19.1	25.9
1/2	20.0	18.7	20.4	23.2	19.3	18.2	21.1	21.9	29.7
5/8	25.0	23.4	25.6	29.0	24.0	22.8	26.4	27.4	37.0
3/4	30.0	28.2	30.6	34.8	28.8	27.4	31.6	32.8	44.4
7/8	35.0	32.8	35.8	40.6	33.6	31.8	36.8	38.2	51.8
1	40.0	37.4	40.8	46.4	38.6	36.4	42.2	43.8	59.4

WEIGHT CONSTANTS:

To find the weights (in pounds) of metals, multiply the contents in cubic inches by the constants given alongside.

Metal	*Weight*
Iron ..	0.27777
Brass ..	0.3112
Tin ..	0.26562
Steel ..	0.28332
Lead ..	0.41015
Aluminium ..	0.09375
Copper ..	0.32118
Zinc ..	0.25318

WELDS AND WELDING:

BUTT WELDS:

Plate Thickness (Inches)	*Type of Weld*	*Gauge of Electrode (S.W.G.)*	*Standard Electrode Length (Inches)*	*Feet of * Electrodes Per Foot of Weld, Including Backing Run*	*Nett * Welding Time Per Foot Including Backing Run (Minutes)*	*Power * Consumption Per Foot of Weld, Including Backing Run (K.W.H.)*
$\frac{1}{8}$	No preparation	12	12	2.0	2.2	0.08
		10	15	1.2	1.2	0.08
		8	15	0.8	0.9	0.08
$\frac{3}{16}$	S.V. 80°	10	15	4.6	4.5	0.30
		8	15	3.1	3.4	0.30
		6	15	2.2	2.7	0.30
$\frac{1}{4}$	S.V. 80°	10	15	6.6	6.6	0.43
		8	15	4.5	5.0	0.43
		8	15	1.5	4.3	0.43
		6	15	2.1		
$\frac{5}{16}$	S.V. 80°	10	15	9.5	9.5	0.64
		8	15	6.5	7.2	0.64
		8	15	1.9	6.0	0.64
		6	15	3.3		
		8	15	1.9	5.3	0.64
		4	18	2.4		

BUTT WELDS – *continued*

Plate Thickness (Inches)	*Type of Weld*	*Gauge of Electrode (S.W.G.)*	*Standard Electrode Length (Inches)*	*Feet of* Electrodes Per Foot of Weld, Including Backing Run*	*Nett* Welding Time Per Foot Including Backing Run (Minutes)*	*Power* Consumption Per Foot of Weld, Including Backing Run (K.W.H.)*
[illegible]	S.V. 80°	8	15	8.5	9.1	0.84
		8	15	2.2	8.1	0.84
		6	15	4.9		
		8	15	2.2	7.4	0.84
		6	15	1.8		
		4	18	2.2		
[illegible]	S.V. 80°	8	15	14.4	15.8	1.45
		8	15	2.2	13.1	1.45
		6	15	8.9		
		8	15	2.3	12.4	1.45
		6	15	2.5		
		4	18	4.4		
[illegible]	D.V. 80°	8	15	7.7	8.4	0.76
		8	15	4.0	7.5	0.76
		6	15	2.6		
		8	15	4.0	6.8	0.76
		4	18	1.8		

BUTT WELDS – *continued*

Plate Thickness (Inches)	*Type of Weld*	*Gauge of Electrode (S.W.G.)*	*Standard Electrode Length (Inches)*	*Feet of* Electrodes Per Foot of Weld, Including Backing Run*	*Nett* Welding Time Per Foot Including Backing Run (Minutes)*	*Power* Consumption Per Foot of Weld, Including Backing Run (K.W.H.)*
5/8	S.V. 80°	8	15	23.4	25.6	2.34
		8	15	2.2	21.1	2.34
		6	15	15.2		
		8	15	2.1	18.1	2.34
		6	15	6.0		
		4	18	6.3		
		8	15	2.2	16.1	2.34
		4	18	10.4		
5/8	D.V. 80°	8	15	13.4	14.6	1.33
		8	15	3.8	11.8	1.33
		6	15	6.3		
		8	15	3.0	11.0	1.33
		6	15	3.6		
		4	18	2.5		

BUTT WELDS – *continued*

Plate Thickness (Inches)	*Type of Weld*	*Gauge of Electrode (S.W.G.)*	*Standard Electrode Length (Inches)*	*Feet of* Electrodes Per Foot of Weld, Including Backing Run*	*Nett* Welding Time Per Foot Including Backing Run (Minutes)*	*Power* Consumption Per Foot of Weld, Including Backing Run (K.W.H.)*
$\frac{3}{4}$	S.V. 80°	8	15	33.7	36.9	3.36
		8	15	2.1	29.4	3.36
		6	15	22.5		
		8	15	2.1		
		6	15	4.6	22.7	3.36
		4	18	11.8		
$\frac{3}{4}$	D.V. 80°	8	15	18.7	20.4	1.86
		8	15	3.0	16.3	1.86
		6	15	10.6		
		8	15	4.0		
		6	15	3.3	14.5	1.86
		4	18	4.5		

Notes: The figures shown for single and double V Butt Welds are for 80° preparation.

For 70° Butt Welds, decrease values for gross length of electrodes, arc time and K.W.H. by 12 per cent.

For 60° Butt Welds, decrease values as above by 22 per cent.

FILLET WELDS:

Nominal Size of Fillet (Inches)	*Throat Thickness (Inches)*	*Plate Thickness (Inches)*	*Gauge of Electrode (S.W.G.)*	*Length of Standard Electrode (Inches)*	*Feet of* Electrodes Per Foot of Weld*	*Nett* Welding Time Per Foot of Weld (Minutes)*	*Power* Consumption Per Foot of Weld (K.W.H.)*
3/16	0.13	3/16 to 1/4	10	15	2.1	2.1	0.14
		1/4 to 1/2	8	15	1.4	1.5	0.14
1/4	0.18	1/4 to 1/2	8	15	2.5	2.7	0.25
		1/4 to 1/2	6	15	1.7	2.1	0.25
		3/8 and over	4	18	1.2	1.6	0.25
5/16	0.22	5/16 to 1/2	8	15	3.9	4.2	0.38
		3/8 and over	6	15	2.7	3.3	0.38
		3/8 and over	4	18	1.9	2.5	0.38
3/8	0.27	3/8 and over	8	15	4.9	5.4	0.48
		3/8 and over	6	15	3.5	4.2	0.48
1/2	0.35	1/2 and over	8	15	8.7	9.6	0.87
		1/2 and over	6	15	6.1	7.5	0.87
		1/2 and over	4	18	4.2	4.7	0.87

FILLET WELDS – *continued*

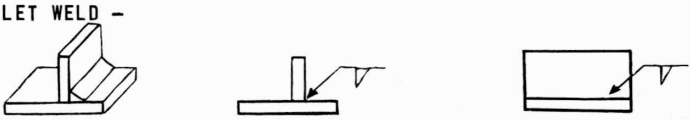
Nominal Size of Fillet (Inches)	*Throat Thickness (Inches)*	*Plate Thickness (Inches)*	*Gauge of Electrode (S.W.G.)*	*Length of Standard Electrode (Inches)*	*Feet of* Electrodes Per Foot of Weld*	*Nett* Welding Time Per Foot of Weld (Minutes)*	*Power* Consumption Per Foot of Weld (K.W.H.)*
5/8	0.44	5/8 and over	8	15	13.8	15.0	1.32
		5/8 and over	6	15	9.6	11.7	1.32
		5/8 and over	4	18	6.6	9.0	1.32
3/4	0.53	3/4 and over	8	15	19.8	21.6	1.95
		3/4 and over	6	15	13.7	16.8	1.95
		3/4 and over	4	18	9.6	12.8	1.95

Note: For costing, see the columns marked with an asterisk (*), electrode, power and labour. The figures for labour are only intended as a guide, the actual time being entirely dependent on the nature of the work. For vertical welding add 10 per cent and for overhead add 15 per cent to the amount of electrode used, and the cost per lineal foot.

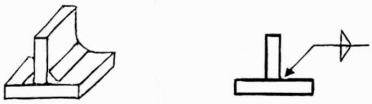
WELDING SYMBOLS:

The symbols, when below the reference line refer to a weld on the 'arrow side' of joint, and when above the reference line, refer to a weld on the 'other side'. The rule applies to the following symbols. For further information, refer to B.S.499:1952 *'Glossary of Terms (With Symbols) Relating to the Welding and Cutting of Metals'*.

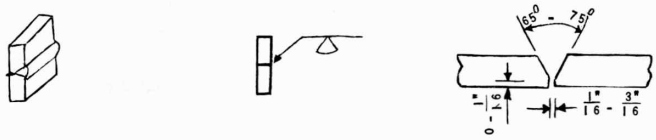
FILLET WELD –



DOUBLE FILLET WELD –

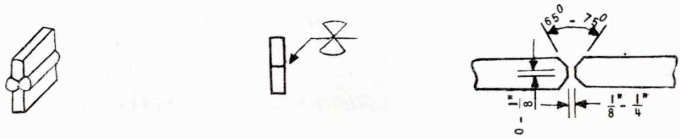


SINGLE V BUTT WELD –



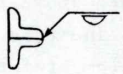
SINGLE V BUTT WELD (WITH SEALING RUN) –

DOUBLE V BUTT WELD –

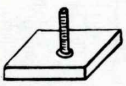


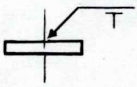
WELDING SYMBOLS – *continued*

EDGE WELD –

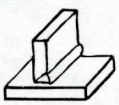


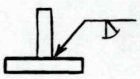
STUD WELD –

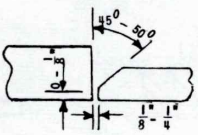




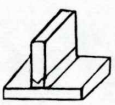
SINGLE BUTT WELD –

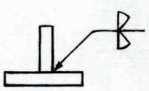


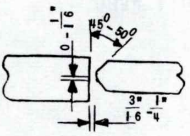




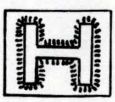
DOUBLE BEVEL BUTT WELD –

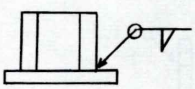






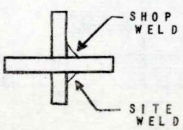
WELD ALL ROUND –

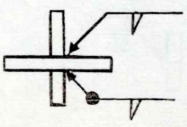




Open circle at join in reference line indicates a continuous weld around joint.

SHOP AND SITE WELDS –

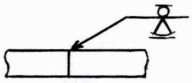




Site welds indicated by closed circle at join in reference line. Shop weld unless so indicated.

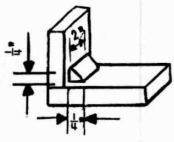
WELDING SYMBOLS – *continued*

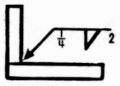
FLUSH FINISH WELDS –



The line indicating the flush finish is placed above or below the weld symbol.

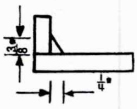
SIZE AND LENGTH OF FILLET WELDS –

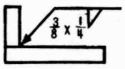




Size of weld given before welding symbol. Length of weld follows symbol.

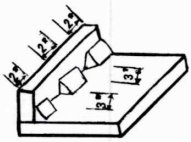
FILLET WELDS WITH UNEQUAL LEG LENGTHS –

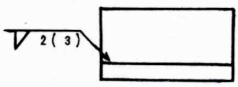




Vertical leg length given first, followed by horizontal leg length.

LENGTH, LOCATION AND SPACING OF WELDS –





Weld length is specified by unbracketed number and spacing distance by bracketed number i.e. 2(3).

In case of weld commencing with unwelded length, symbol would be (3)2.

WIRE, WIRE ROPES AND GAUGE TABLES:

SHEET AND WIRE GAUGES:

INCHES:

Gauge Number	*Imperial Standard Wire Gauge (S.W.G.)*	*Birmingham Sheet Gauge (B.G.)*	*Birmingham Wire Gauge (B.W.G.)*	*Morse Drill and Wire Gauge*	*U.S. Gauge for Sheet Iron (U.S.G.)*	*Brown and Sharpe Gauge (B. & S.)*	*U.S. Gauge for Steel Wire (U.S.W.G.)*	*Wood and Machine Screws (S.G.)*	*Music Wire Gauge*
7/0	0.500	0.6666	–	–	0.500	–	0.490	–	–
6/0	0.464	0.6250	–	–	0.469	0.5800	0.4615	–	–
5/0	0.432	0.5883	0.500	–	0.438	0.5165	0.4305	–	–
4/0	0.400	0.5416	0.454	–	0.406	0.4600	0.3938	–	–
3/0	0.372	0.5000	0.425	–	0.375	0.4096	0.3625	0.032	–
2/0	0.348	0.4452	0.380	–	0.344	0.3648	0.3310	0.045	0.0085
1/0	0.324	0.3964	0.340	–	0.313	0.3249	0.3065	0.058	0.009
1	0.300	0.3532	0.300	0.228	0.281	0.2893	0.2830	0.071	0.010
2	0.276	0.3147	0.284	0.221	0.266	0.2576	0.2625	0.084	0.011
3	0.252	0.2804	0.259	0.213	0.250	0.2294	0.2437	0.097	0.012
4	0.232	0.2500	0.238	0.209	0.234	0.2043	0.2253	0.110	0.013
5	0.212	0.2225	0.220	0.205	0.219	0.1819	0.2070	0.124	0.014
6	0.192	0.1981	0.203	0.204	0.203	0.1620	0.1920	0.137	0.016
7	0.176	0.1764	0.180	0.201	0.188	0.1443	0.1770	0.150	0.018
8	0.160	0.1570	0.165	0.199	0.172	0.1285	0.1620	0.163	0.020
9	0.144	0.1398	0.148	0.196	0.156	0.1144	0.1483	0.176	0.022
10	0.128	0.1250	0.134	0.193	0.140	0.1019	0.1350	0.189	0.024
11	0.116	0.1113	0.120	0.191	0.125	0.0907	0.1205	0.203	0.026
12	0.104	0.0991	0.109	0.189	0.109	0.0808	0.1055	0.216	0.028

SHEET AND WIRE GAUGES – *continued*

INCHES:

Gauge Number	*Imperial Standard Wire Gauge (S.W.G.)*	*Birmingham Sheet Gauge (B.G.)*	*Birmingham Wire Gauge (B.W.G.)*	*Morse Drill and Wire Gauge*	*U.S. Gauge for Sheet Iron (U.S.G.)*	*Brown and Sharpe Gauge (B. & S.)*	*U.S. Gauge for Steel Wire (U.S.W.G.)*	*Wood and Machine Screws (S.G.)*	*Music Wire Gauge*
13	0.092	0.0882	0.095	0.185	0.094	0.0720	0.0915	0.229	0.030
14	0.080	0.0785	0.083	0.182	0.078	0.0641	0.0800	0.242	0.032
15	0.072	0.0699	0.072	0.180	0.070	0.0571	0.0720	0.255	0.034
16	0.064	0.0625	0.065	0.177	0.0625	0.0508	0.0625	0.268	0.036
17	0.056	0.0556	0.058	0.173	0.0562	0.0453	0.0540	0.282	0.038
18	0.048	0.0495	0.049	0.169	0.0500	0.0403	0.0475	0.295	0.040
19	0.040	0.0440	0.042	0.166	0.0437	0.0359	0.0410	0.308	0.042
20	0.036	0.0392	0.035	0.161	0.0375	0.0320	0.0348	0.321	0.044
21	0.032	0.0349	0.032	0.159	0.0344	0.0285	0.0317	0.334	0.046
22	0.028	0.0313	0.028	0.157	0.0313	0.0254	0.0286	0.347	0.048
23	0.024	0.0278	0.025	0.154	0.0281	0.0226	0.0258	0.361	0.051
24	0.022	0.0248	0.022	0.152	0.0250	0.0201	0.0230	0.374	0.055
25	0.020	0.0220	0.020	0.149	0.0219	0.0179	0.0204	0.387	0.059
26	0.018	0.0196	0.018	0.147	0.0188	0.0159	0.0181	0.400	0.063
27	0.0164	0.0175	0.016	0.144	0.0172	0.0142	0.0173	0.413	0.067
28	0.0148	0.0156	0.014	0.140	0.0156	0.0126	0.0162	0.426	0.071
29	0.0136	0.0139	0.013	0.136	0.0141	0.0113	0.0150	0.439	0.074
30	0.0124	0.0123	0.012	0.128	0.0125	0.0100	0.0140	0.453	0.078
31	0.0116	0.0110	0.010	0.120	0.0109	0.0089	0.0132	0.466	0.082

SHEET AND WIRE GAUGES – *continued*

INCHES:

Gauge Number	*Imperial Standard Wire Gauge (S.W.G.)*	*Birmingham Sheet Gauge (B.G.)*	*Birmingham Wire Gauge (B.W.G.)*	*Morse Drill and Wire Gauge*	*U.S. Gauge for Sheet Iron (U.S.G.)*	*Brown and Sharpe Gauge (B. & S.)*	*U.S. Gauge for Steel Wire (U.S.W.G.)*	*Wood and Machine Screws (S.G.)*	*Music Wire Gauge*
32	0.0108	0.0098	0.009	0.116	0.0102	0.0080	0.0128	0.479	0.086
33	0.0100	0.0087	0.008	0.113	0.0094	0.0071	0.0118	0.492	0.090
34	0.0092	0.0077	0.007	0.111	0.0086	0.0063	0.0104	0.505	0.094
35	0.0084	0.0069	0.005	0.110	0.0079	0.0056	0.0095	0.518	0.098
36	0.0076	0.0061	0.004	0.106	0.0070	0.0050	0.0090	0.532	0.102
37	0.0068	0.0054	–	0.104	0.0066	0.0045	0.0085	0.545	0.106
38	0.0060	0.0048	–	0.101	0.0063	0.0040	0.0080	0.558	0.112
39	0.0052	0.0043	–	0.099	–	0.0035	0.0075	0.571	0.118
40	0.0048	0.0039	–	0.098	–	0.0031	0.0070	0.584	0.125
41	0.0044	0.0034	–	0.096	–	–	0.0066	0.597	–
42	0.0040	0.0031	–	0.093	–	–	0.0062	0.611	–
43	0.0036	0.0027	–	0.089	–	–	0.0060	0.624	–
44	0.0032	0.0024	–	0.086	–	–	0.0058	0.637	–
45	0.0028	0.0022	–	0.082	–	–	0.0055	0.650	–
46	0.0024	0.0019	–	0.081	–	–	0.0052	0.663	–
47	0.0020	0.0017	–	0.078	–	–	0.0050	0.676	–
48	0.0016	0.0015	–	0.076	–	–	0.0048	0.690	–
49	0.0012	0.0013	–	0.073	–	–	0.0046	0.703	–
50	0.0010	0.0012	–	0.070	–	–	0.0044	0.716	–

WEIGHTS OF WIRE ROPES:

Prefix B.S.		Number 4/37		Number 6/19		Number 6/24		Number 6/37		Number 6/61	
Circumference of Rope (Inches)	Diameter of Rope (Inches)	Weight Per 100 Feet (Pounds)	Actual Breaking Load (Tons)	Weight Per 100 Feet (Pounds)	Actual Breaking Load (Tons)	Weight Per 100 Feet (Pounds)	Actual Breaking Load (Tons)	Weight Per 100 Feet (Pounds)	Actual Breaking Load (Tons)	Weight Per 100 Feet (Pounds)	Actual Breaking Load (Tons)
3/4	–	9	1.7	9	1.5	8	1.4	–	–	–	–
1	5/16	18	3.0	18	2.8	16	2.4	18	2.9	–	–
1 1/8	3/8	22	3.7	21	3.3	20	3.3	21	3.4	–	–
1 1/4	–	26	4.3	25	4.3	24	4.0	25	3.9	–	–
1 3/8	7/16	33	5.5	30	4.9	28	4.8	30	4.7	–	–
1 1/2	–	39	6.5	36	6.0	33	5.7	36	5.8	–	–
1 5/8	1/2	47	7.9	43	7.2	39	6.6	43	6.8	–	–
1 3/4	9/16	53	8.9	50	8.1	47	7.5	50	8.0	–	–
2	5/8	71	11.8	66	11.1	60	10.3	66	10.7	–	–
2 1/8	11/16	78	13.1	74	12.1	67	11.6	74	12.1	–	–
2 1/4	–	86	14.5	84	13.9	78	12.8	84	13.8	–	–
2 3/8	3/4	97	16.6	92	15.7	86	14.1	92	14.5	–	–
2 1/2	13/16	106	18.1	102	17.0	95	16.3	102	16.2	102	15.7
2 3/4	7/8	132	22.1	123	20.5	113	19.3	123	19.9	123	17.9
3	15/16	153	25.7	154	25.8	134	22.7	145	24.1	145	21.5
3 1/8	1	168	28.5	168	27.5	148	24.5	159	26.2	159	24.1
3 1/4	–	180	30.4	184	30.0	159	27.3	172	27.4	172	25.5
3 3/8	1 1/16	190	32.5	196	32.7	170	29.2	185	29.7	185	28.3

WEIGHTS OF WIRE ROPES – *continued*

Prefix B.S.		*Number 4/37*		*Number 6/19*		*Number 6/24*		*Number 6/37*		*Number 6/61*	
Circumference of Rope (Inches)	*Diameter of Rope (Inches)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*
3 1/2	1 1/8	207	35.6	217	35.5	188	31.3	198	32.2	198	29.8
3 3/4	–	239	40.1	247	40.4	213	35.5	230	37.3	230	34.4
3 7/8	1 1/4	261	43.6	262	43.5	226	37.7	242	40.0	242	36.0
4	–	273	45.9	275	45.6	239	41.2	263	42.8	263	39.4
4 1/4	–	312	52.4	308	51.1	275	46.0	295	48.7	295	44.7
4 3/8	1 3/8	329	55.1	336	54.6	289	48.6	311	50.2	311	46.6
4 1/2	–	344	57.7	350	58.1	312	51.2	333	53.4	333	50.3
4 3/4	1 1/2	385	64.8	392	64.3	344	57.9	369	60.0	369	54.3
5	–	–	–	420	70.9	378	63.6	409	66.9	409	60.5
5 1/8	1 5/8	–	–	448	75.0	395	66.6	434	70.5	434	64.8
5 1/4	–	–	–	476	79.1	413	69.6	453	74.2	453	67.0
5 1/2	1 3/4	–	–	523	86.4	450	75.8	493	79.9	493	73.9
5 3/4	–	–	–	574	93.9	488	84.1	538	87.9	538	81.1
6	1 7/8	–	–	626	103.3	527	91.0	590	96.3	590	88.6
6 1/4	2	–	–	672	111.6	587	99.9	632	102.9	632	93.9
6 1/2	–	–	–	728	120.1	630	107.4	682	111.9	682	102.0
6 3/4	2 1/8	–	–	–	–	–	–	740	119.0	740	110.4

WEIGHTS OF WIRE ROPES – *continued*

Prefix B.S.		*Number 4/37*		*Number 6/19*		*Number 6/24*		*Number 6/37*		*Number 6/61*	
Circumference of Rope (Inches)	*Diameter of Rope (Inches)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*	*Weight Per 100 Feet (Pounds)*	*Actual Breaking Load (Tons)*
7	–	–	–	–	–	–	–	799	128.6	799	119.2
$7\frac{1}{4}$	–	–	–	–	–	–	–	852	138.8	852	128.3
$7\frac{1}{2}$	$2\frac{3}{8}$	–	–	–	–	–	–	920	149.2	920	137.7
$7\frac{3}{4}$	–	–	–	–	–	–	–	968	157.4	968	147.5
8	–	–	–	–	–	–	–	1052	168.5	1052	157.6

Note: For the following qualities of wire rope, add the given per cent figures to the actual breaking loads shown above:

Special improved patent steel, 90 to 100 tons per square inch, add 12 per cent.

Best plough steel, 100 to 110 tons per square inch, add 24 per cent.

Special improved plough steel, 110 to 120 tons per square inch, add 35 per cent.

Extra special improved plough steel, 115 to 125 tons per square inch, add 41 per cent.

WEIGHTS OF WIRES:

POUNDS PER 100 FEET:

S.W.G.	*Copper*	*Brass*	*Aluminium*	*Iron*	*Nickel Silver*	*Monel Metal or Nickel*
7/0	76.58	72.01	23.0	66.7	74.1	76.1
6/0	65.95	62.01	19.83	57.44	–	–
5/0	57.10	53.75	17.26	49.79	–	–
4/0	49.01	46.09	14.80	42.69	–	–
3/0	42.39	39.86	12.80	36.93	41	42.76
2/0	37.09	34.88	11.17	32.31	–	–
0	32.15	30.23	9.66	28.01	31.1	31.9
1	27.54	25.92	8.30	24.01	–	–
2	23.33	21.94	7.00	20.32	22.6	23.16
3	19.45	18.29	5.86	16.85	18.8	19.20
4	16.49	15.50	4.97	14.36	15.9	16.37
5	13.77	12.95	4.10	12.00	–	–
6	11.79	10.62	3.40	9.81	10.9	11.18
7	9.49	8.92	2.85	8.26	–	–
8	7.84	7.37	2.36	6.82	7.58	7.77
9	6.30	5.97	1.91	5.53	–	–
10	5.02	4.72	1.51	4.37	4.85	4.98
11	4.12	3.87	1.25	3.60	–	–

WEIGHTS OF WIRES – *continued*

POUNDS PER 100 FEET:

S.W.G.	*Copper*	*Brass*	*Aluminium*	*Iron*	*Nickel Silver*	*Monel Metal or Nickel*
12	3.31	3.11	0.996	2.88	3.20	3.28
13	2.59	2.44	0.783	2.25	–	–
14	1.96	1.84	0.590	1.70	1.9	1.93
15	1.59	1.49	0.476	1.38	–	–
16	1.25	1.18	0.376	1.10	1.21	1.25
17	0.96	0.93	0.289	0.83	–	–
18	0.71	0.66	0.212	0.61	0.682	0.695
19	0.49	0.46	0.148	0.42	–	–
20	0.40	0.37	0.119	0.34	0.384	0.387
21	0.31	0.29	0.094	0.27	–	–
22	0.24	0.23	0.076	0.21	0.232	0.238
23	0.18	0.16	0.053	0.15	–	–
24	0.15	0.14	0.045	0.13	0.143	0.147
25	0.12	0.12	0.037	0.11	–	–
26	0.10	0.09	0.029	0.09	0.096	0.098

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